Journal of FORESTRY

DECEMBER 1956

Including Index

SOCIETY OF AMERICAN FORESTERS 1900

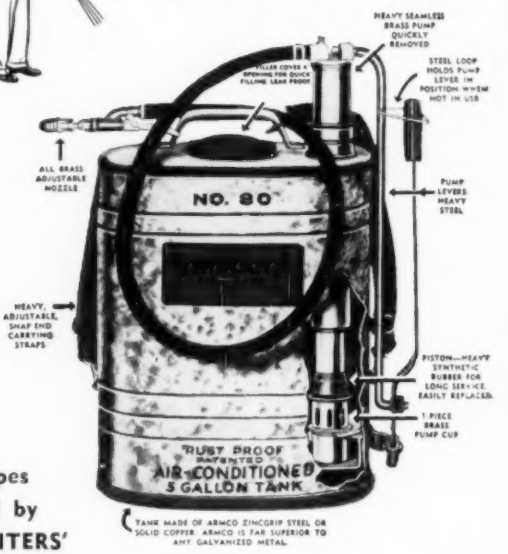
Volume 54
Number 12

When you're shooting for the best...choose

INDIAN FIRE PUMPS!

No. 80 LEVER TYPE PUMP and HANDLE

INDIAN FIRE PUMP


HEAVY SEAMLESS BRASS PUMP QUICKLY REMOVED
STEEL LOOP HOLDS PUMP LEVER IN POSITION WHEN NOT IN USE
ALL BRASS ADJUSTABLE NOZZLE
PUMP LEVERS HEAVY STEEL
NO. 80
HEAVY, ADJUSTABLE, SNAP END CARRYING STRAPS
PISTON—HEAVY SYNTHETIC RUBBER FOR LONG SERVICE EASILY REPLACED
1 PIECE BRASS PUMP CUP
RUST PROOF PATENTED AIR-CONDITIONED 5 GALLON TANK
TANK MADE OF ARMCO ZINCGRIP STEEL OR SOLID COPPER. ARMCO IS FAR SUPERIOR TO ANY GALVANIZED METAL

No. 90 SLIDING PUMP TYPE

INDIAN FIRE PUMP

Both Types Approved by UNDERWRITERS' LABORATORIES

SEND FOR NEW CATALOG

Fire Truck built by W. S. Darley & Co., Chicago, Ill., delivered to Manila Fire Dept., Republic of the Philippines. Note **INDIAN FIRE PUMPS** mounted.

"We have 6 of your **INDIAN FIRE PUMPS** on one of our fire trucks and we have used them 8 years. They are still **just like new.** They are the best things a county fire department can have. I have used them for everything, including grass, house, barn and many other kinds of fires. We like them very much. **There is nothing else like them.**"

EARL L. KOCH, Assistant Chief
Ann Arbor TWP F. D.,
Ann Arbor, Mich.

D. B. SMITH & CO. 407 Main St., Utica 2, N.Y.

"FOR 70 YEARS THE LEADERS"

Canadian Agents:
Fleck Bros., Ltd., Vancouver, B. C., Canada
C. E. Hickey & Sons, Ltd., Hamilton, Canada
Rising Hardware Co., Toronto, Canada

Pacific Coast Branches:
Hall & Miller Supply Co., Seattle 4, Wash.
Harris Supply Co., Los Angeles 15, Calif.
Fred E. Barnett Co., Alameda, Calif.
Fred E. Barnett Co., Portland, Ore.
L. H. Curtis & Sons, Salt Lake City 9, Utah

VOLUME 54 ● NUMBER 12 DECEMBER 1956

Journal of Forestry

Editorial Staff

ARTHUR B. MEYER ..... *Editor*

HENRY CLEPPER ..... *Managing Editor*

L. AUDREY WARREN ..... *Business Manager*

Associate Editors

R. KEITH ARNOLD, *Forest Fire*, California Forest and Range Experiment Station, P. O. Box 245, Berkeley 1, Calif.

ROBERT R. BLUMENSTEIN, *Forest and Wood Utilization*, Timber Engineering Company, 4812 Minnesota Avenue, N. E., Washington 19, D. C.

ROBERT E. DILS, *Watershed Management*, School of Natural Resources, University of Michigan, Ann Arbor, Mich.

JOHN W. DUFFIELD, *Silviculture*. Forest Industries Tree Nursery, P. O. Box 172, Nisqually, Wash.

S. R. GEVORKIANTZ, *Mensuration*, Lake States Forest Experiment Station, University Farm, St. Paul 1, Minn.

HARVEY J. MACALONEY, *Forest Pathology and Entomology*, Lake States Forest Experiment Station, St. Paul Campus, University of Minnesota, St. Paul 1, Minn.

RALPH W. MARQUIS, *Forest Economics and Policy*, Northeastern Forest Experiment Station, 102 Motors Avenue, Upper Darby, Pa.

CHARLES E. POULTON, *Range Management*, Withcombe Hall 302, Oregon State College, Corvallis, Ore.

CLARENCE W. RICHEN, *Forest Management and Engineering*, Crown Zellerbach Corporation, Public Service Building, Portland 4, Ore.

PHILIP C. WAKELEY, *Forest Genetics and Artificial Regeneration*, Southern Forest Experiment Station, 704 Lowich Building, 2026 St. Charles Avenue, New Orleans 13, La.

LEE E. YEAGER, *Forest-Wildlife Management and Recreation*, Colorado Cooperative Wildlife Research Unit, 243 Forestry Building, Colorado A & M College, Fort Collins, Colo.

LLOYD THORPE, *Advertising Representative*, Medical Arts Building, Seattle 1, Wash.

The JOURNAL OF FORESTRY, established in 1917, is the official organ of the Society of American Foresters, but the Society assumes no responsibility for the statements and opinions expressed by contributors.

Publication office, 425 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Address all correspondence concerning editorial or business matters to JOURNAL OF FORESTRY, 425 Mills Building, 17th Street at Pennsylvania Avenue N. W., Washington 6, D. C. Published monthly. Subscription $7.50 per year; single copies 75 cents. Missing numbers will be replaced without charge provided claim is made within thirty days after date of the following issue.

The editors are not responsible for loss or damage of manuscripts and photographs while in transit or in their possession. All material submitted for publication should be accompanied by return postage.

Copyright, 1956, by the Society of American Foresters.

Entered as second-class matter at the post office at Washington, D. C. Acceptance for mailing at the special rate of postage provided for in the Act of February 28, 1925, embodied in Paragraph 4, Section 412, P. L. and R. authorized November 10, 1927.

CONTENTS

COVER: Before the harvest comes the growing. A Tioga County, New York Christmas tree grower shown last summer shaping a 5-year-old Scotch pine with hand scythe, using pruning shears around the leader.

Determination of Desirable Growing Stock—A Central Problem of Forest Management *Kenneth P. Davis* 811

Bale Storage Effective for Loblolly Pine Seedlings *S. J. Ursic* 815

Potential Uses of Helicopters in Forestry *Thomas Hansbrough* 817

The Wildlife Society *Daniel L. Leedy* 821

Timber Stand Improvement in Ozark Forests—an Appraisal After 15 Years *Eugene Shoulders* 824

Seed Source and Nursery Effects on Yellow-Poplar Plantations *Gustaf A. Limstrom* and *Raymond F. Finn* 828

Pocket Gophers as a Cause of Mortality in Eastern Washington Pine Plantations *Richard Wm. Dingle* 832

Managing Hardwoods for Quality Increment *S. R. Gevorkiantz* 836

Some Statistical Needs in Forest Economics *Charles H. Stoddard* 841

Notes 843

1955 Christmas Tree Data; Plotless Timber Cruising Tested in Upland Hardwoods; The Chipola Chimney: A Cone Kiln for Research Use; Grubs in the Trunks of Live Green Ash Trees.

We Present 848

Clarence S. Herr, Industrial Forester.

Reviews 851

Tomorrow's Birthright: A Political and Economic Interpretation of our Natural Resources; Nature's Guardians; California and the Southwest; The White-Tailed Deer in Wisconsin; Publications of Interest.

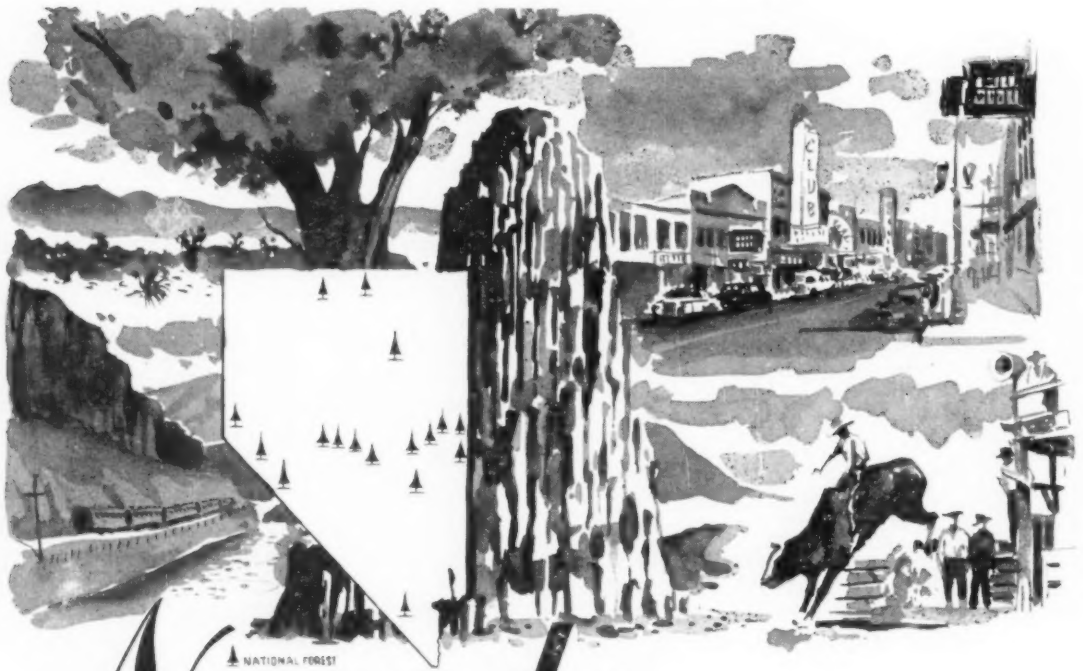
Current Literature 854

Society Affairs 855

Forestry News 866

Index to Advertisers 876

No. 26 of a series featuring forestry practices, projects and products . . .



Nevada —Frontier of Modern Forestry

Nevada is generally regarded as a treeless state. Yet the 12% in forest lands, a small percent of the state, actually amount to 8,650,000 acres, an area nearly one third larger than the state of Maryland. Dominant are the single-leaf pinyon and the Utah juniper. But, in all, there are 220 species and varieties, 79 are native, 141 introduced.

Woodlands are confined almost entirely to the mountain slopes where rainfall is sufficient for growth. Although some second growth is logged from 200,000 acres of commercial forests in the Sierra Nevadas to the west, wood use in Nevada is generally limited to fuel and fence posts.

In this vast semi-arid country, water is king. In addition to water for domestic and irrigation, forested areas graze thousands of cattle and sheep. Thus, the water sheds they create are the most valuable "product" of Nevada forests.

The U. S. Forest Service, Bureau of Land Management and the Office of State Forestry share protection and management responsibility. The state forestry organization, developing mainly since 1950, is now responsible for some 2 million acres of forest and watershed land in state and private ownerships. Emphasis has been on protection from forest and range fires, and although the goal is not reached, progress has been made.

This year will see also the institution of a cooperative forest management and tree planting progress, the latter stressing ranch wind breaks, shelter belts and woodlots. Plans now in process will establish a state nursery to round out the program. State forestry is assisted in its work by the U. S. Forest Service under the various public laws and in cooperation with the Extension Service, University of Nevada, Bureau of Land Management, Soil Conservation Service and groups from various counties.

STATE FORESTER-FIREWARDEN — *contribution to this series does not necessarily constitute endorsement of Southern Glo Products.*

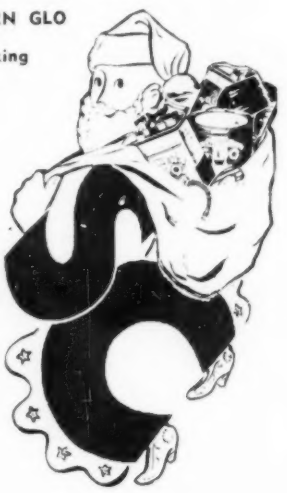
Seasons Greetings

from the manufacturers of

SOUTHERN GLO

tree marking

paints



SOUTHERN COATINGS AND CHEMICAL CO. Dept. 2, Sumter, South Carolina—New Orleans, La.

Journal of Forestry

Official Organ of the Society of American Foresters

Determination of Desirable Growing Stock—A Central Problem of Forest Management[1]

Kenneth P. Davis
Professor of forest management,
University of Michigan,
Ann Arbor

MANY years ago, Filibert Roth succinctly pointed up the problem of desirable growing stock in the statement: "Room to grow but none to waste." The forest manager needs to know what quantity, distribution, and quality of forest growing stock will produce the maximum net return possible under current and anticipated conditions of management.

The problem is of central importance. In some form and degree it is faced nearly every time a tree is removed in making partial cuttings and when stands are regenerated. As we become increasingly concerned with timber growing as a continuing business, specific determination of the desirable growing stock upon which it depends becomes correspondingly more important. Interest in growing stock determination is a good index of progress in forest management.

The problem is difficult because it is multi-dimensional, requiring knowledge, balance, and integration of both biological and economic considerations. Both general and specific answers are needed, the latter to meet the needs of individual timber growers who are concerned with particular kinds and conditions of forest stands and purposes of management. There is no end to the problem either; technological and economic changes constantly demand new answers and new applications. It was not long ago that we thought of sawlog forestry primarily. Now, there is large emphasis on fiber production as well, and the life of a single forest stand extends further than we can look into the future with any certainty.

The problem is also difficult, since complex in total as it is, for field application it must be answered in rather simple and eminently workable terms. It is necessary to narrow the gap often considered to exist between theory and practice and make the latter merely a logical and practical fruition of the former, as should always be the case. Consequently, the concern here is with a problem for which helpful general answers are obtainable but for which there is also endless need for specific adaptation and application. This is characteristic of forest practice in general, which is both a science and an art.

Physical and Biological Limits

In approaching the problem it is desirable first to consider certain physical and biological limits within which a forester must work. For a given site there is a certain combination of soil, light, temperature, and moisture available that can produce a rather finite amount of woody growth per year. Different combinations of tree species can make somewhat more or less efficient use of a particular site, but these limits seem to be fairly narrow. Results from cutting studies have increasingly shown that thinnings or other partial cuttings result in no increase in total growth. What can be accomplished is a concentration of growth on desirable stems; the effect is qualitative rather than quantitative so far as total woody production per acre is concerned. Table 1 illustrates the point. It summarizes total growth made in a thinned and unthinned white pine plantation over a 35-year period, 1920 to 1955. All growth, including mortality, was consistently measured in both thinned and unthinned stands. As indicated, there is no significant difference in total wood production measured in cubic feet.

Much evidence is accumulating which indicates that full utilization of a forest site from a growth standpoint can be had over a considerable range in stocking as foresters commonly measure it, providing trees have time to adjust to changing spatial relationships. This is an important point in practical management, as it indicates that there is a rather wide zone of tolerance within which the forester can operate.

Uncertainty as to the limits of this range emphasizes the fact that foresters have scanty knowledge of total growth made in a forest stand. Most growth data available are periodic and net and do not

TABLE 1.—THIRTY-FIVE YEARS OF GROWTH IN A THINNED AND UNTHINNED NORTHERN WHITE PINE PLANTATION, SAGINAW FOREST, MICHIGAN. AGE 19 TO 54

Item	Thinned	Unthinned
	Cu. ft. per acre	
Mortality	183	1,956
Volume cut	3,760	
Volume in 1955	5,498	7,326
Total wood prod.	9,441	9,282

[1]Originally presented before Forestry Section, Michigan Academy of Science, Arts and Letters, Ann Arbor, Michigan, March 23, 1956.

take mortality fully into account. More importantly, growth measurements are commonly based on the main stem only, often including only a part of it. Foresters are, rather naturally, primarily concerned with the bole and sometimes find it hard to see the tree as an entity. From a physiological standpoint, the whole tree must be considered. This means not only the stem, but the width, depth, and density of the crown as a photosynthetic mechanism. Unfortunately, total leaf area, cambial area, or something directly related to the total utilization of the site by the tree in growth processes is very hard to measure.

Measurement of tree bole size is a fairly good index of productivity for conifers but less so for hardwoods. It is popularly assumed that on comparable sites conifers produce more wood than do hardwoods. They usually do in terms of usable products under current merchantability standards. However, if one can consider utilization of the total tree and also take differences in specific gravity of the wood into account, hardwood growth appears in a much different light. For example, if a consistent market for oak pulpwood of all sizes developed in lower Michigan, ideas about the volume productivity potential of oak would change markedly. We have little idea of the tonnage of fiber produceable per acre per year in oak stands.

General relationship between total wood growth potentially and currently obtainable are shown in Figure 1. The top line shows total wood growth obtainable from full site utilization if everything is counted on—twigs, branches, stems, and all. The next line shows total woody growth physically obtainable under current merchantability conditions. The third line shows total wood growth obtained and utilized by present management. Where to draw these lines in physical and relative terms for a particular site is, of course, the problem and currently largely conjecture. It does seem important, however, to recognize that these

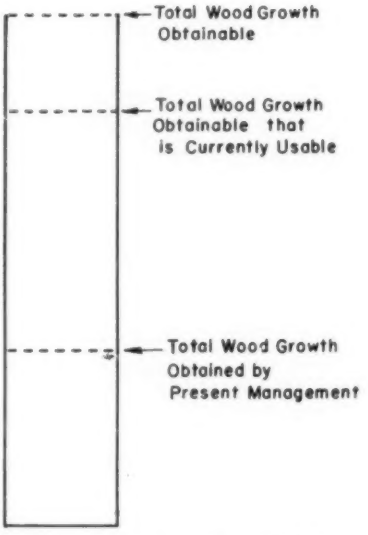

Total Wood Growth Obtainable
Total Wood Growth Obtainable that is Currently Usable
Total Wood Growth Obtained by Present Management

FIG. 1.—Forest growth potentials.

relationships exist. An obvious objective of management is to increase currently utilized growth as nearly as practicable to total potential wood growth. Values as well as volumes obviously must be considered. In most situations, current growth obtained is probably far below the maximum even currently possible and in no sense do I wish to imply that maximum potential physical growth is a desirable economic objective; in this country, at least at the present time, it is not. Just the same, as definite planwise management of forest lands is increasingly undertaken, practicably obtainable growth goals are continually being raised, and the existence of this large physical potential assumes greater significance.

While we do not know a great deal about total growth, there is a considerable store of knowledge as to about how much total volumetric growing stock a site can support at a given age, and particularly in even-aged stands. In such stands, and for a number of major forest types, studies of volume and stand structure of fully stocked natural stands have been made that are presented in what we call normal yield tables. While these tables are useful in defining upper maximum limits of growing stock in quantitative terms, they do not indicate, as we are coming to appreciate, desirable growing stock under management. They picture over-stocked stands from the standpoint of future growth and since all figures are net, they greatly under-estimate actual growth both made and potentially obtainable.

To summarize physical knowledge, we have considerable quantitative empirical information on the net growth of forests in terms of the main stem as obtained over fairly long periods. Information is meager and incomplete on total woody growth actually made in a forest stand, of the relation of stocking as we measure it to total utilization of the site, and as to what constitutes full site utilization. Indications are that it can be obtained over a fairly wide range of forest stocking, as expressed in main stem density.

Growing Stock in Even-Aged Stands

With this physical background in mind, I should like to consider definition of desirable growing stock under management more specifically. There are two general kinds of stands making up a forest, even-aged and uneven-aged. There are also many intermediate forms to confuse the picture. The characteristic feature of an even-aged stand is that it has a beginning and an end. A crop of trees is reproduced, tended, and eventually harvested, and the process repeated. A generalized life history of an even-aged stand is shown in Figure 2.

Curve *A* shows the maximum volumetric stocking that can be carried on the ground at any given age and site. Information of this sort is obtainable from normal yield tables and we have a fair knowledge of where this curve lies at least for some forest types and sites. Curve *C* indicates minimum volumetric stand stocking that will fully utilize the site. The location of this curve is largely conjectural and in reality is not as simple a curve as shown.

A life pattern of a managed

stand is shown by Curve *B*. A stand originates, receives a number of partial cuttings, and eventually a major regeneration cut is made and the process starts over again. The rotation is defined by the average age at which this regenerative process is consummated and is dictated by the time necessary to grow the major forest products desired to an acceptable state of maturity. When natural regeneration is employed, a shelterwood is often left for a period to furnish seed and reproduce the stand as shown by the broken line. Wide variation is obviously possible in the number, character, weight, and timing of intermediate cuts. Stocking may fall below that needed fully to utilize the site or it may not. We do know, however, that one cannot expect to have full site utilization both before and immediately after an intermediate cut; trees cannot respond that quickly. Growth of stands is a flow process. If cuttings are frequent, the flow is but little affected. If cuttings are occasional and heavy, the flow is interrupted and total productivity of the site is reduced in proportion to the time it takes trees to adjust to new spatial relationships.

Total yield from the particular stand over its life, or annually from a fully regulated forest of such stands, is shown in Figure 2 by the bar diagram at the right. It is made up of two parts; that obtained from the major harvest cut and that obtained from intermediate cuttings. The proportion between these may be highly variable. Together, they represent total net utilized growth. If no intermediate cuttings are made, then the harvest cut obviously represents total growth utilized. Under intensive management, the total yield from intermediate cuts may substantially exceed that obtained from the major harvest cut.

Growing stock must be defined in mensurational, silvicultural, and financial terms. Quantitatively, it must be translated into basal area, cubic feet, board feet, cords, or piece measure as may be appropriate. Beyond this, the number, size, and diameter distribution of the trees making up the growing stock at different ages needs to be defined. It is necessary to consider species composition, tree vigor, and quality. Desirable stocking must also be weighed in terms of both production costs and value of the resultant products. It is clear, consequently, that definition of desirable growing stock through the life pattern of a stand requires a substantial amount of specific and rather varied information.

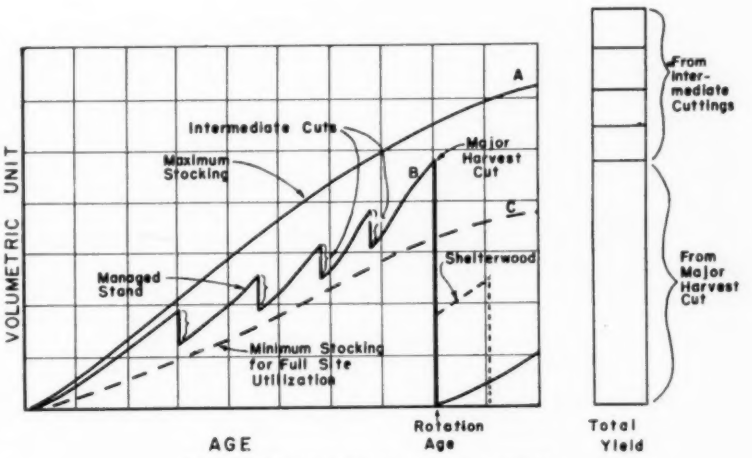


FIG. 2.—Management of even-aged stands.

Growing Stock in Uneven-Aged Stands

The characteristic feature of an uneven-aged stand is that it has no specific beginning or end in time; reproduction and harvest is more or less continuous. Nobody has ever literally established an uneven-aged stand. It is always necessary to start with something and go on from there.

The general pattern of an uneven-aged stand over time is shown in Figure 3. As with the graph for an even-aged stand, curves *A* and *C* represent the upper and lower limits of stocking fully utilizing the site. They assume essentially a straightline form in this situation because they would change only with site quality. Both lines are broken since information is meager as to where they lie. About all we know is that there is some zone of stocking within which full utilization of the site can occur. As previously pointed out, we do not even know for sure just what full utilization of the site means.

Curve *B* represents the pattern of a stand under management. It starts with some residual growing stock represented here in volumetric terms. The stand grows for a period, the cutting cycle, which may be one year or twenty years or more, and a portion of the growing stock is harvested and another cycle begun. By cutting more or less than growth during a cutting cycle, the residual level of the growing stock may be increased or diminished.

As with even-aged stands, what constitutes desirable growing stock must be defined and translated into mensurational, silvicultural, and financial terms involving about the same factors and considerations.

I have never seen a yield table for uneven-aged stands for a particular site and species association. A basic reason is that such tables necessarily have to be derived from managed stands and at least in this country, uneven-aged management has not progressed to the point or continued long enough for preparation of such tables to be possible. With adequate data they could be prepared and considerable data on yields obtainable from management of uneven-aged stands is available, but is too fragmentary and insufficient for preparation of integrated and complete tables, as has been done for even-aged stands.

The structure of the stand composing the residual growing stock

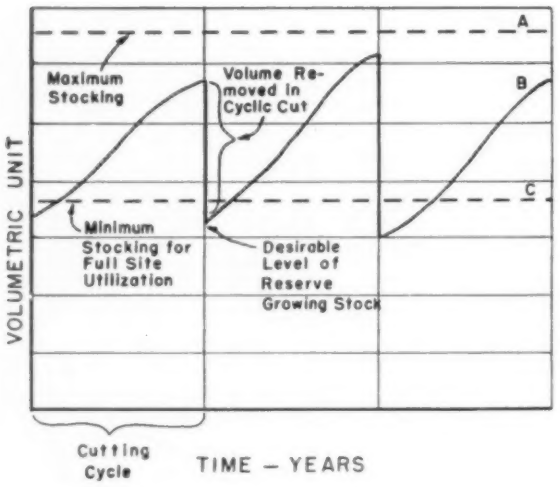


Fig. 3.—Management of uneven-aged stands.

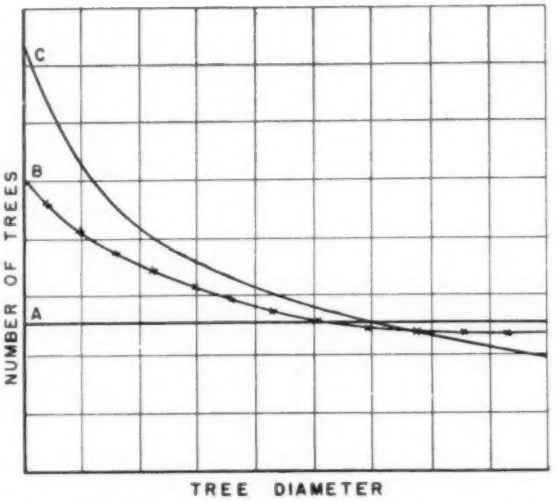


FIG. 4.—Distribution of growing stock in an uneven-aged stand.

is particularly important in uneven-aged management. Desirable growing stock must be defined not only in total quantitative terms, as indicated in Figure 3, but as to the species, kind, quality, number, and diameter distribution of the trees that compose it. Figure 4 indicates the general nature of the structural problem. The basic need is to establish and maintain a progression of tree sizes (which in general are proportional to age) so that trees of desired size are continually becoming available for harvest. The question is what sort of a diameter distribution is most desirable to suit specific purposes of management.

A general aim is to concentrate as much of the growth as possible on trees producing quality products, which in general means the larger trees. Consequently, the higher the average diameter of the stand, the greater the proportion of total growth that is being put into products of merchantable value. From an economic standpoint, the most desirable situation is shown by horizontal curve *A* in which there are an equal number of trees in each diameter class. This gives the maximum possible average stand diameter. Biologically, such a distribution would not be at all practicable; all trees are not good trees, mortality will occur, and an excess number of smaller trees must be recruited to serve as a sort of pool from which to select better trees, to serve as trainers, and to cushion mortality. Curves *B* and *C*—and a whole family of similar curves could be drawn—indicate normal situations in which there is a progressive increase in the number of trees as diameter decreases.

The basic management question in definition of desirable reserve growing stock is how flat can one make the diameter distribution. Economically, the flatter the better. For biological reasons, the form of the curve will vary with tree species, level of growing stock desired, mortality situation, regenerative needs, and quality considerations.

It is possible to express the form of these curves mathematically, and it has been done in various ways. One of them is to assume some fixed or progressive ratio between the number of trees of successive diameter classes. While mathematical techniques are valuable in analysis and in representing desirable tree distribution patterns, it should be kept in mind that the problem is basically biological and economic and cannot be solved by mathematical reasoning alone.

A saving feature in this whole situation is the fact that there seems to be a fairly wide zone of tolerance as regards the amount and distribution of growing stock within which reasonably full utilization of the site may be obtained. It is not necessary to have a smooth diameter-number of trees distribution. In actual stands there are and will be irregularities. With sound silvicultural knowledge, skill and good sense, deficiencies in some diameter classes can be offset by excesses in others without much effect in total growth so long as the irregularities are not excessive. Stand structure studies are presently a major need in the development and effective application of uneven-aged management. It is encouraging that considerable emphasis is currently being given to this kind of work.

Summary

In summary, I would make these points:

1. Determination of desirable growing stock for particular purposes of management is a multi-aspect problem requiring integration and balancing of many biological and economic factors.

2. General answers of large basing-point value can be had. There is need for guiding patterns of the structure of desirable growing stock expressed in physical terms to which economic considerations can be applied.

3. Complete and specific solutions meeting all situations cannot be developed, and this should be recognized frankly. There are end-

less possibilities of what constitutes desirable growing stock in specific situations, and it is not possible to pile up sufficient information of a "what" nature to answer all questions.

4. There seems to be a fairly wide range of tolerance in seeking adequate answers. This point is highly significant in practical management. Considerable give and take is possible, both in total volume of growing stock and in its specific structural distribution.

5. Corollary to the above, much must be left to competent integrative judgment of the man on the ground. This, plus a working range in acceptable tolerance, is a saving feature to what otherwise might seem an unduly complicated problem. With sound general guides, it is not so difficult to work out these problems—a tree, a group of trees, or a stand at a time in actual practice.

6. To further effective application on the ground, there is need for intensive and controlled study to gain a more thorough understanding of the physiology and ecology of tree growth which underlies the whole problem.

Bale Storage Effective For Loblolly Pine Seedlings

S. J. Ursic
Southern Forest Experiment Station
Forest Service,
U. S. Department of Agriculture

A STUDY CONDUCTED in north Mississippi during 1955 indicates that loblolly pine seedlings can be successfully stored in standard Forest Service bales for as long as five weeks and that storage in properly packed and cared-for bales is preferable to conventional heeling-in.

Successful methods of seedling storage have been developed by the Forest Service through experience and research. Deffenbacher and Wright[1] found that survival of several West Coast species was not impaired by cold storage of seedlings in bales for as long as six months if proper storage conditions were maintained. In the South, Wakeley[2] reported that slash and longleaf planting stock can be stored up to four weeks in U.S. Forest Service bales if the bales are kept moist and not allowed to heat.

The U. S. Department of Agriculture's Yazoo-Little Tallahatchie Flood Prevention Project in north Mississippi is currently planting 40 million loblolly pine seedlings each year. Despite careful planning, it is often necessary to store seedlings between receipt from the nurseries and delivery to the planting site. To determine the best method of storing loblolly seedlings under north Mississippi conditions, the Tallahatchie Research Center of the Southern Forest Experiment Station, in cooperation with the Yazoo-Little Tallahatchie Project, compared the effects of several storage methods and periods on field survival and early growth.

Design and Procedure

Eighteen freshly packed bales of freshly lifted seedlings from the same seed source were used. Seedlings were packed in standard U. S. Forest Service bales of 2,000 seedlings each and received no preferential treatment at the nursery. On January 22, upon receipt from the nursery, approximately 24 hours after packing, all seedlings were placed in storage.

Four methods of storage were tested. Six bales were placed in a cold-storage room, six were stored on racks in an unheated warehouse, and six randomly selected bundles of 50 seedlings from each of the remaining six bales were placed in a heel-in bed of deep sand.

Seedlings were heeled-in with the six bundles from each bale in a separate row—three bundles unbroken and three bundles broken and spread. At each planting, heeled-in seedlings were taken from a single row and therefore represented a single bale.

Bales on the warehouse racks (Fig. 1) and in cold storage were spaced to allow free air movement around each bale. Temperature within the cold storage bales was held at 33-35 degrees F. and relative humidity in the storage room was about 90 percent; these are the conditions recommended for western species. Temperatures inside the bales were taken frequently by inserting a 12-inch glass thermometer well into the ends of the bales. Taking temperatures within the bales is important, for even refrigerated bales will heat if they are packed too closely. Although not used in the study, a maximum-minimum thermometer would be well suited for checking internal bale temperatures.

The seedlings from each storage treatment were outplanted on 6 different days of varying weather and soil moisture conditions after storage periods of 2, 9, 16, 23, 32, and 37 days. Outplanting started

[1] Deffenbacher, F. W., and E. Wright. Refrigerated storage of conifer seedlings in the Pacific Northwest. Jour. Forestry 52: 936-938. 1954.

[2] Wakeley, P. C. Planting the southern pines. U. S. Dept. Agric. Monograph 18, pp. 129-130. 1954.

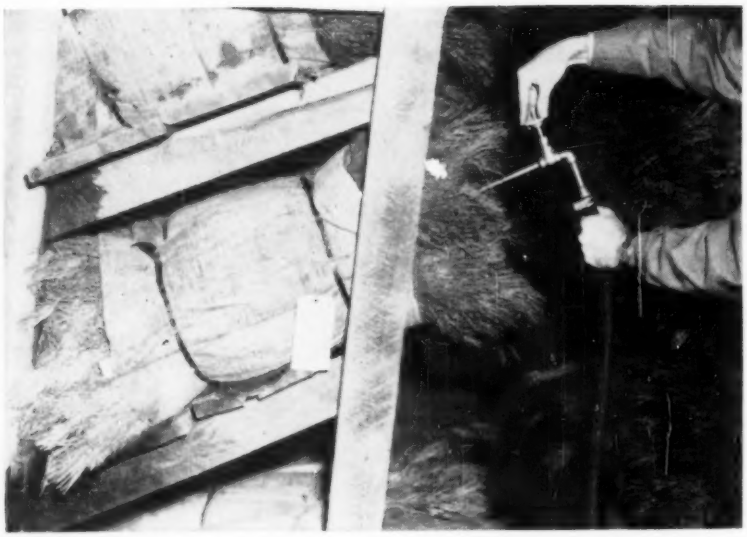


FIG. 1.—In north Mississippi, loblolly pine planting stock has been stored for 5 weeks on racks in an unheated warehouse. Seedlings were packed in standard Forest Service bales and were watered every 2 or 3 days.

on January 24, 1955. It was done in three randomized blocks on a typical eroded old field with a loessial soil and a fair broomsedge cover. Each block included one plot of 36 seedlings for each of the 24 treatments (4 storage methods times 6 storage periods).

Results

First-year survival of seedlings was excellent despite a short drought in late summer. The lowest survival for an individual plot of 36 seedlings was 75 percent. Overall average survival as recorded in October 1955 was 95 percent for seedlings that had been kept in bales in cold storage, 93 percent for those stored in bales on warehouse racks, 91 percent for seedlings heeled-in with bundles broken, and 90 percent for heeled-in seedlings in unbroken bundles. The average survival for all 24 treatments was 92 percent.

By statistical test, survival of trees stored in bales in cold storage was superior to survival from either of the heel-in methods. Survival of trees stored in bales on racks was superior to that of seedlings heeled-in with bundles intact. Differences in survival for all other comparisons were not statistically significant.

Average first-year height growth for all treatments combined was 0.55 feet. Height growth of seedlings heeled-in with bundles broken and spread was superior to the growth of the seedlings heeled-in with unbroken bundles or stored in bales on racks. This result tends to bear out the contention that there is root development in the heel-in beds if the roots of individual seedlings are in close contact with moist soil. Differences in height growth for all other comparisons were not statistically significant. The gain in height growth from breaking bundles when heeling-in was so slight (less than 0.05 foot) that it probably did not justify the extra labor.

Duration of storage for periods up to five weeks, independent of storage method, had no apparent effect on either first-year survival or first-year height growth.

Even after 37 days in storage, seedlings from the warehouse and from cold storage smelled fresh, showed no signs of mold, and had good color except that many primary needles on the lower one-third of seedling stems had turned brown. From the third week on, the foliage of heeled-in seedlings appeared grey and dry even though the roots were kept moist. This dry appearance of the foliage seemed to become more pronounced as the storage period lengthened; it was especially noticeable on stock heeled-in with bundles unbroken. By the fourth and fifth weeks the tops of some of the heeled-in seedlings were completely brown. These seedlings were discarded. It seems likely that seedlings stored for long periods in heel-in beds would need heavier culling than seedlings stored in bales.

During the 1955 planting season, the Yazoo-Little Tallahatchie Flood Prevention Project stored some 15 million seedlings in bales on warehouse racks for varying intervals. Despite adverse planting sites and a late summer drought, average first-year survival for these trees was over 80 percent and storage costs were materially reduced.

Conclusions

This study indicates that loblolly pine seedlings can be stored successfully by any of the four methods used. Storage up to five weeks under conditions prevailing during 1955 had no apparent effect on either first-year survival or first-year height growth.

Storage in U. S. Forest Service bales can be recommended on the basis of convenience and economy especially where large numbers of seedlings are involved. When properly packed and watered, baled seedlings remain in better physical condition than heeled-in seedlings, and handling and storage costs can be reduced. This conclusion is supported by past work with other species and a large-scale test involving some 15 million seedlings.

When practicable, cold storage in bales may be preferable to storage in bales on racks in unheated buildings. Bales in cold storage require less watering and, paradoxically, the seedlings seem less likely to freeze.

Potential Uses of Helicopters in Forestry

Thomas Hansbrough
Assistant professor of forestry,
Louisiana State University,
Baton Rouge, Louisiana

IN RECENT YEARS, with the demand for more intensive forest management, foresters have employed various devices that have aided in accomplishing the job. Many of the methods and much of the equipment that was looked upon with skepticism or unheard of in past years have now become accepted as standard practices.

As the forestry industry increases in economic importance and prestige, foresters must of necessity improve their methods of managing timberland. This will mean taking advantage of all ideas and equipment that will improve forest management. Developments over the past ten years in the field of rotary-wing aircraft have at last produced a vehicle — the helicopter — which very readily lends itself to many of our more important problems.

History

The rotary wing principle of flight has engaged scientific thought for centuries. In its first form, the helicopter was conceived by Leonardo da Vinci in the fifteenth century. While the idea of vertical flight itself was simple, the development of the idea was extremely complicated and da Vinci, like hundreds of successors, failed due to the lack of sufficient power to lift or propel the machine.

The world's first practical helicopter was developed in 1937 by Dr. Heinrich Focke of the Focke-Wulf Company. However, it wasn't until 1942 in this country, that the Sikorsky XR-4 made its first flight. This machine was the forerunner of the many war-inspired helicopters now being produced in the United States (*8*).

Helicopter Theory of Flight

The theory of flight in the helicopter is the same as in other types of aircraft; the only difference is in the way of obtaining lift, which makes present-day flight possible. In conventional type aircraft this lift is made possible by mounting a powerplant on the machine and, either with or without a propeller, the aircraft is pulled or pushed through the mass of air. This mass of air flowing over the greater curvature on the top surface of the airfoils, or wings, produces a differential in air pressure above and below the wing, giving lift. This principle of lift is based on Bernoulli's theorum that "as velocity increases, pressure decreases." Another principle of lift is based on Newton's Law of Action and Reaction which states that "for every action there is an opposite and equal reaction." Due to the angle the wing makes with the relative wind the air is striking the bottom surface of the wing and is being reflected downward. In exerting this downward force the wing receives an upward counterforce—the same principle that makes a gun recoil (*12*). In the helicopter, the driving force of the powerplant is attached directly to the airfoils, or rotor blades, and by rotating these blades through the air mass, they produce lift, thus flight.

In a single-rotor helicopter, the rotating of the rotor blades in one direction produces a counter-rotation of the helicopter's fuselage in the opposite direction. To overcome this, a boom is attached to the fuselage, at the end of which is placed a small propellor or tail rotor which when rotated counteracts the torque.

By connecting controls to the main and tail rotors it is possible to take off and land vertically, to hover in stationary flight, and to fly forwards, backwards, and sideways.

Helicopter Uses in Forestry

This dramatic new development in air travel, while not a panacea for all our transportation and service problems, is a proven implement available for its proper place in the field of wild land management.

The variety of uses to which the helicopter can be put is far from completely known; however, foresters cannot afford to overlook this vehicle in any plans for forest management involving reconnaissance, transportation of personnel, equipment or supplies, or special project service, whether they be concerned with fire suppression, timber survey, direct seeding, insect control, road studies, etc. (*11*).

The U. S. Forest Service and private forestry in the West used helicopters for fire control as long ago as 1947, and although the machine was new and rather limited in its performance they were very much impressed. In more recent years with improvements in design and lifting capabilities they have used it more and more, and the testimony as to its performance reads like that given to some "wonder medicine."

Fire Control

Without going into much detail, the following examples show the importance of helicopter use in fire suppression on some of the Forest Service holdings in the West during the 1953 fire season (*9*):

Battle Creek Fire on August 18.—This fire was in a blind area near a creek bottom, and available information indicated a fire of large proportion would develop shortly. Through the use of a small helicopter, a fire boss and eleven men were immediately placed on the spot. At daylight the following morning a helicopter reconnaissance trip indicated everything under control. Had it not been possible to make close observation and take immediate action on this fire, prompt dispatching would most certainly have called for the mobilization of a hundred or more men, together with the necessary food, supplies, and equipment. The probable cost of moving and supplying 100 men in the area would have been about $30,000, while the actual suppression cost was approximately $5,500.

Meeker Ridge Fire on August 7.—Two jumpers were dropped on this fire on the morning of August 7, and a helicopter reconnaissance at 7:00 a.m. the same morning indicated the fire was adequately manned; however, there was a vast body of highly inflammable fuels, six or seven miles in extent, in advance of the fire. At 2:00 p.m. another helicopter reconnaissance indicated that the fire was out of control. A message was dropped to the jumpers, who cleared a 'copter spot nearby and five more men were placed on the spot. By the next morning the fire was under control. If early discovery of the situation had not been made and additional men placed on the job almost immediately, a project fire of considerable proportion would have no doubt resulted. Considering the fuels, slope, and exposure, with burning conditions as they were, the fire would probably have reached 100 acres or more before control could be effected. Conservative costs of a fire of this size in primitive country would be around 40 to 50 thousand dollars. By use of a helicopter, the fire was held to a class B blaze at a cost of $650.

In explaining the importance of helicopters in fire control on Region 1 of the U. S. Forest Service, Harris (*9*) wrote: "The 1953 fire season can be rated as one of the worst experienced in fire suppression work in this district. The potential for large and costly fires was present. By the use of the helicopter it is believed the entire situation was managed with greater ease and efficiency, with fewer dispatching errors, greater economy and less loss of natural resources than in any previous fire situation of similar intensity. Use of the helicopter made it possible to hold 38 fires, which developed under severe burning conditions in remote areas, to a burned acreage of 90.8"

Until the past few months the Forest Service contracted or chartered nearly all helicopter service, with rental cost varying from $70 to $100 per flight hour, depending on type of work and other conditions. The Forest Service now owns one Sikorsky S-51 helicopter, and it has been assigned to the California Region for expanded field trials in fighting forest fires. During 1955 the Forest Service used helicopters for 765 hours of flight operation.

One might contend that there is no comparison in fighting forest fires in the West to those in other sections, especially the South. In the South the forest area is not as remote, but how about the other side of the ledger? While this area may be more accessible, there is a serious problem when it comes to numbers of fires. During 1954 in the 15 southern states, there were 152,000 forest fires with approximately eight million acres being burned. The estimated damage of these fires was $38 million, while the cost of control was $15.7 million, a total loss of about $54 million. It is known that a great number of these fires are caused by arsonists, whether deliberate or supposedly accidental. Probably the greatest single factor in controlling any fire, especially these "spot sets," is rapid detection and suppression. Certainly the helicopter fits into our plans from the standpoint of reconnaissance and maneuverability of fire crews.

Timber Surveying

To purchase a helicopter for the single purpose of fire control might be an unwise investment, but since the achievements of the helicopter can be summed up by one word, its "flexibility," it very readily fits into other plans of forest management, especially one that is becoming more and more important, timber surveying.

A few years ago when land prices were so low that one could purchase forty acres for the price of a good pair of boots, and corporation vice-presidents were more easily fooled, timber surveying wasn't considered very important; but today it's another story. Land prices are much higher, to say the least, and some of the vice president's problems have been transferred over to the forest land manager. For now more than ever, he needs to know not only what the land is worth, but also what is it producing and what is its potential. The answer to these questions is important to his job, as well as the jobs of others. In addition, the sound investment of corporation capital depends upon an accurate, up-to-date, and concise measurement. Terms that were unheard of ten years ago—continuous forest inventory, use of IBM equipment in forestry, etc., are now in our midst. If foresters are to do their job in the field of timber surveying, they must be more efficient.

In the field of timber cruising, particularly for large areas, the helicopter offers many advantages over previous methods. Until fairly recently timber cruising was chiefly a test of man against the forest, as the collection of all statistics on forest area and timber volumes and the preparation of forest type and condition maps was dependent upon having enough rugged individuals to sample the timberland on foot. Necessarily, this was time-consuming and expensive. With the development of aerial photography there has been a growing trend toward less ground work and more emphasis upon the use of aerial photographs for determining forest areas, for making various kinds of forest maps, and

even in some cases for measuring timber volumes.

For many purposes high-altitude aerial photographs plus ground sampling will give the best results. However, for most effective use of aerial photographs they must be recent, accurate as to scale, and taken with the right type of film and filter. Unfortunately, this isn't always the case. A few of the larger forest industrial operators have had their lands photographed, but this is usually done after their plans for timber management are well advanced, for the cost is fairly high and the flying often takes several months because of weather conditions. Extensive timber surveys of large tracts being considered for purchase, estimates of wood supplies in pulp-mill procurement territories, and publicly financed inventories of timber supplies within states or counties all require quick, accurate, and economical methods of determining forest area and volume of timber. For these, the helicopter opens up new possibilities.

In the southern pine area, there are approximately 193 million acres of commercial forest land. Obviously, to cruise this vast acreage once every 10 years or as needed to maintain an up-to-date inventory of the forest resources would mean taking advantage of all equipment and sampling methods which reduce costs and at the same time give accurate results.

The Southeastern Forest Experiment Station conducted an experiment on 453,000 acres in South Carolina to check the practicality of the helicopter for survey purposes, comparing a helicopter method of forest survey to the regular method of forest survey (*6*). After the flying was completed, the plot classifications were summarized and a stratified sample of plots was selected for ground cruising. The field checks showed that through the use of a helicopter the forest type was indicated correctly on 87 percent of the plots, density was correct on 86 percent, and stand class correct on 78 percent. Idle land was classified correctly 80 percent of the time. It was encouraging to find that each class of forest land was classified with fairly uniform accuracy. Inasmuch as the classifying was done by observers with no previous air experience and over forest stands that were very difficult to classify, it seems reasonable to believe that accuracy could be considerably improved with practice. In any event this trial gave better results than had been obtained through interpretations of aerial photographs, even after six months' constant experience in using them.

For this particular method of extensive timber survey there appears to be little choice from a cost standpoint, as the use of the helicopter added less than $30 to the total cost of the operation. This would seem to be a cheap price to pay for a more accurate, up-to-the minute classification of timber conditions upon which to base volume estimates (*6*).

Another example of the role of the helicopter in forest survey work which was fairly extensive in nature was conducted in 1955 by T & H Engineering and Forestry, Ltd., of Vancouver, B. C., using chartered Bell helicopters (*3*). A timber cruise was carried out over a period of four months. A total of 1,750,000 acres were covered, requiring 500 hours of flying time. Without a helicopter, the company estimated that the job would have taken them five years. They estimated a savings of over $40,000 alone in direct cost of moving men and equipment. This savings does not include supplying the men with food nor take into account the lost time there would have been because of the breakdown of equipment and not being able to service it quickly; neither does it include the indirect cost of reconnaissance which eliminated much field work. The chartered cost of the helicopter on this particular job was about $80 per hour.

It is apparent that the use of helicopters on this forest survey proved to be advantageous as well as economical. Some of the more important advantags obtained on this extensive survey (*13*) were:

(1) *Planning.*—The job organization and field planning were started immediately and carried forward at a fast rate of speed by aid of short reconnaissance trips.

(2) *Crew dispersal.*—Crews were dispersed quickly and effectively to areas that were more suitable to work at the time in question. New camp sites and working areas were located during the first time of moving, thus insuring no lost time when the next camp move took place.

(3) *Moving crews, equipment and supply.*—Although the maximum pay load might only be 500 pounds, the helicopter was so versatile that many trips and a high payload were transported in one flying day. These were short trips as far as the helicopter was concerned, but would have been difficult and time consuming if they were made by back-packing.

(4) *Supervision.* — Supervisory work was carried out with maximum efficiency, probably one of the most important features attributable to the helicopter. The most remote area or crew could be reached readily. This had the secondary benefit that sick or accident cases were quickly attended, and also insured that broken equipment and instruments could be readily repaired.

(5) *Crew morale.*—The morale of the men was kept high. There were many reasons for this, the chief one being the elimination, at least to a great extent, of the back-packing work. Also, the supply of fresh food was kept more plentiful and correspondence and contact with the outside world was never far away.

(6) *Area coverage and accuracy of work.* — Using the helicopter, there were no areas that could not be reached, if one or two days of packing were allowed. This meant that most all forest types and areas could be examined on the ground and a close-up reconnaissance of all other doubtful areas could be carried out along with the progress of the main job. These factors eliminated the guess work during the compilation stages at a later date. A more accurate answer was the result.

Direct Seeding

In the southern pine area there are approximately 20 million acres in need of planting. If planting is continued at the present rate, it is doubtful whether the job will ever be completed. At any rate, it will take a long time. Recent research has indicated at last that many of these acres can be direct seeded. As a matter of fact this method of re-establishment offers, in many cases, the only economical method. Here again the "flexibility" of the helicopter lends itself to our problem. Direct seeding in forestry via the small helicopter has also been done (*3*). The seeds were dropped from hoppers and reached the ground with a dispersion of approximately one seed to every four feet. With the use of ground markers the desired area was evenly supplied with seed, eighty acres being covered in ten minutes.

Insect and Disease Control

There is another ever increasing problem in the management of forest lands; namely, insects and disease. Rather than getting better, it is getting worse, and foresters generally hide behind the excuse that there is no feasible economical control. Improved chemicals offer a method of control but the application of these chemicals presents another problem. The airplane has been used for limited aerial application of dust and sprays, but anyone who flies knows this is a very hazardous way of making a living because of the danger encountered in flying low and slow at tree-top level. When it comes to dusting and spraying, no other equipment can equal the over-all performance of the helicopter. Its accuracy, coverage, operating economy, and maximum kill are unexcelled. The combination of its inherent maneuverability and powerful main rotor downwash makes it ideal for thoroughly covering vegetation with either dry or wet insecticides and fungicides. Maneuverability permits the helicopter to fly close at slow speeds into confined areas and to land anywhere for reloading and refueling. Equipped with dusting and spraying kits, the helicopter can cover up to 100 acres an hour with a controlled swath up to 100 feet wide. The main rotor downwash, which forces earthward about 1,800,000 cubic feet of air a minute, swirls the dust or spray up under the foliage, thereby affording complete coverage (*1*). The present average price for chartered dust and spray work is about $1.50 per acre.

Table 1.—Comparison of Costs and Specifications of Four Small Helicopters and One Light Airplane

Specifications	Bell[1]	Hiller[2]	Cessna[3]	Brantly[4]	Cessna 180[5]
List price	$35,750	$39,300	——	——	$12,950
Max. gross wt. (lbs.)	2350	2500	3000	1550	2550
Empty wt. (lbs.)	1409	1678	1975	930	1490
Useful load (lbs.)	941	822	1025	620	1060
No. passengers incl. pilot	3	3	4	2	4
Max. speed at max. wt. (mph)	90	84	122	110	165
Endurance (hrs.)	3.8	2.5	3.8	——	——
Engine horsepower	200	200	260	170	230
Direct operating cost per hr.	$17.84	$20.07	——	——	$10.47[6]

[1]From "Introducing the Bell Model 47G Helicopter" (*1*).
[2]From "Introducing the Hiller 12-C Helicopter" (*10*).
[3]From "Cessna CH-1 Helicopter" (*4*).
[4]From "The Brantly B-2 Helicopter" (*2*).
[5]From "The New Cessna 180" (*5*).
[6]From records of the Louisiana Forestry Commission.

Helicopter Costs and Maintenance

No discussion of this type would be complete without taking into consideration the costs involved. A few years ago the cost of a helicopter, as well as its operation and maintenance cost, were almost prohibitive. However, these costs have been considerably reduced by the competitive spirit and freedom of enterprise of American industry.

There are presently four small helicopters which will probably meet the needs of the forest industry. Two of these have been on the market for some time and their prices, as well as very accurate information on their operating and maintenance cost, are available. These two are the Bell Helicopter and the Hiller Helicopter. The other two, which show good promise, are being manufactured by the Cessna Aircraft Company and Brantly Helicopter Corporation.

The tabulation in Table I shows briefly the costs and specifications of these helicopters. Included in this table for comparison is the Cessna 180 aircraft, with which most foresters are familiar. There are no available prices or operating costs for the Cessna and Brantly helicopters. Cessna states that its machine was designed for the purpose of simplifying the light helicopter, and therefore its overall cost and cost of operation and maintenance is expected to be lower than competitive helicopters. Brantly has not established a definite price; however, it will be less than $20,000.

Naturally some of these items listed will vary depending on the conditions. For example, the maximum gross weight which a helicopter can lift depends on "density altitude," which is in itself dependent on altitude and temperature. The useful load includes gas, oil, and cargo; therefore, the distance a load is to be carried will affect endurance. The direct operating cost includes fuel, oil, engine overhaul, spare parts, and maintenance and does not include cost of pilot, insurance, and depreciation. It is the opinion of many in the helicopter industry that the direct operating cost will be reduced in the future as the length of service of some of the more important component parts will be increased. These parts account for a great percentage of the direct operating cost.

The helicopter is not difficult to maintain. However, it does require frequent checking on the part of maintenance personnel due to its many moving parts. The following recent report (*7*) submitted to Bell Aircraft Corporation is convincing testimony to the dependability being obtained today from this most versatile vehicle.

"Now that our busy season is

over, I thought you might like to know how your equipment fared under the hardships of the great Northwest.

"As both pilot and mechanic, I flew and maintained a Bell 47-G for 525 hours over an eight month period. From the 7th of June to the 20th of June, I flew 113 hours, of which one day was 12:54 hours, and for seven consecutive days, averaged over ten hours a day. The landings were from 5000 to 7000 feet, carrying two men, and up to eighty pounds of equipment. Density altitudes often reached 9000 feet. The Forest Service thought that I may have set an unofficial record by moving 117 men eight miles into primitive area in one day.

"During the large fire outbreak in September, I flew 171 hours in 37 consecutive days, under extreme adverse weather conditions of smoke and turbulence. All maintenance was done in the field, and the one hundred hour inspections were divided, and part done with each twenty-five hour inspection. During the four and one-half month fire season I had 100% availability, and the only unscheduled maintenance was minor—replacing two control cables, and a leaking needle valve in the carburetor."

Literature Cited

1. BELL AIRCRAFT CORP. 1956. Introducing the new Bell model 47G helicopter.
2. BRANTLY HELICOPTER CORP. 1956. The Brantly B-2 helicopter.
3. CARLSON, A. 1956. Okanagan, pioneer of helicopter mountain flying. Jour. Amer. Helicopter Soc. 1(1): 137-140.
4. CESSNA AIRCRAFT CO. 1956. Cessna CH-1 helicopter.
5. ———. 1956. The new Cessna 180.
6. CRUIKSHANK, J. W. 1947. The Forest Survey tests the helicopter. Jour. Forestry 45:878-883.
7. GAYLORD, H. 1956. The future of the light helicopter. Jour. Amer. Helicopter Soc. 1(2):16-17.
8. GODWIN, D. P. 1946. Helicopter hopes for fire control. Fire Control Notes 7(1):16-21.
9. HARRIS, H. K. 1954. Helicopter use—fire suppression. Fire Control Notes 15(2):7-12.
10. HILLER HELICOPTERS. 1956. Introducing the Hiller 12-C.
11. JEFFERSON, F. J. 1948. The helicopter—a new factor in fire control. Fire Control Notes 9(1):1-9.
12. MONTGOMERY, J. 1953. Theory of flight of Sikorsky helicopters. Sikorsky Aireraft Division of United Aireraft Corp.
13. REID, E. S. The role of the helicopter in forest survey work. An unpublished report to Okanagan Helicopters, Ltd. January 1956.

The Wildlife Society[1]

Daniel L. Leedy
Secretary-treasurer The Wildlife Society, % Fish and Wildlife Service, Washington, D. C.

THE WILDLIFE SOCIETY, a nonprofit, tax-exempt, scientific and educational organization, was officially organized in February, 1937. Need for such a society in the wildlife field had been felt by wildlife educators, technicians, and administrators during the early 1930s when wildlife conservation as a profession was just coming into its own. Wildlife courses were being added to the curricula in the few colleges and universities offering wildlife training; facts were needed on which to base wildlife management programs; and trained personnel was needed not only to solve some of the unknowns but also to carry out the programs. Recognized, too, was the need for a journal which would serve as an outlet for wildlife articles and ensure distribution of such articles to the growing numbers of individuals and organizations engaged in wildlife management.

At the First North American Wildlife Conference held in Washington, D. C., February 3-7, 1936, a group of people interested in wildlife conservation discussed these needs and the feasibility of forming a wildlife society. The outcome of these discussions was the formation of The Society of Wildlife Specialists, which functioned for a year under the chairmanship of Professor Ralph T. King. During that time about 100 individuals affiliated with the Society. A number of these affiliates convened February 27-28, 1937, immediately preceding the Second North American Wildlife Conference for the purpose of organizing on a permanent basis. At this meeting The Society of Wildlife Specialists was transformed into The Wildlife Society. A constitution and bylaws were adopted, and officers were elected as follows: president, Rudolf Bennitt; vice-president, Joseph Dixon; secretary, Victor H. Cahalane; and treasurer, Warren W. Chase. W. L. McAtee accepted editorship of a new journal, the *Journal of Wildlife Management*, which became the official organ of the Society. A membership committee was appointed and within six months the Society had more than 500 members. Persons who had belonged to The Society of Wildlife Specialists automatically became charter members of The Wildlife Society providing they joined the new Society by September 1, 1937. On March 25, 1948, the Society was incorporated in Washington, D. C.

Objectives

As stated in Article II of its By-Laws, the objectives of The Wildlife Society are to facilitate: (1) the establishment and maintenance of the highest possible professional standards; (2) the development of all phases of wildlife management along sound biological lines; and (3) the dissemination of publications to effect these ends.

[1] *Editor's note.*—This is the second in a series of articles dealing with the organization and objectives of technical societies that should be well known to readers of the JOURNAL OF FORESTRY.

Membership

Membership is open to all persons interested in wildlife management who have the endorsement of one or more members. From 1937 to 1950, there were two regular membership classes—associate and active. Only the active members could vote or hold office. Since 1950 there has been but one regular membership class. Although there are no stated professional requirements for membership, a majority of the members are career workers in the wildlife field or students engaged in professional wildlife training. Honorary members are persons who, upon a majority vote of the Council (governing body) and a majority vote of the members present at the annual meeting of the Society, are thus recognized for their distinguished service or outstanding achievement in the field of wildlife management. Honorary members include Arthur A. Allen, J. N. Darling, Charles S. Elton and Frank Darling of England, P. F. English, Paul Errington, Ira N. Gabrielson, Seth Gordon, C. F. Gutermuth, George O. Hendrickson, E. R. Kalmbach, Harrison Lewis and Hoyes Lloyd of Canada, W. L. McAtee, Herbert L. Stoddard, Walter P. Taylor, and Harold Titus. Any member may become a life member by paying $100 in a lump sum, or not less than $25 per year over a period of four years or less.

As of December 31, 1955, The Wildlife Society had approximately 3,000 members and subscribers (including 17 honorary members, 27 life members, 2,503 regular members and 429 subscribers) from the United States, Canada, and Alaska, and from distant lands including Africa, Argentina, Australia, Belgium, Brazil, Ceylon, Czechoslovakia, Denmark, England, Finland, France, Germany, Holland, India, Israel, Italy, Japan, New Zealand, the Philippines, Norway, Russia, Scotland, Sweden, and Switzerland.

Annual membership dues are $6, which includes subscriptions to the *Journal of Wildlife Management* and "The Wildlife Society News." The subscription rate for the *Journal of Wildlife Management* is $6 to subscribers, either domestic or foreign, and includes postage. Dues are payable to The Wildlife Society.

Administration

The Society is governed by a Council composed of the president, vice-president, secretary-treasurer, outgoing president and one elected regional representative from each of the following regions: (1) Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, New Jersey, Delaware, and West Virginia; (2) Virginia, Maryland, District of Columbia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Puerto Rico, and Virgin Islands; (3) Ohio, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Illinois, and Indiana; (4) North Dakota, South Dakota, Montana, Wyoming, Nebraska, Colorado, and Kansas; (6) Arizona, New Mexico, Texas, Oklahoma, and Mexico; (6) Washington, Oregon, California, Idaho, Nevada, Utah, Alaska, and Hawaii; and (7) Canada.

Upon petition of 10 or more members, sections of the Society may be authorized by the Council to promote wildlife management on a more local basis. Currently in existence are the Northeast, Southeast, Northwest, Central Mountains and Plains, California, and Minnesota Sections.

Regional representatives are nominated and elected annually by a majority vote of the members residing in each region. The president and vice-president are elected by mail ballot for a term of one year and are eligible for reelection for two additional terms of one year each. The secretary-treasurer, selected by a majority vote of the Council, serves for an indefinite number of years at the discretion of the Council. He is executive officer of the Society under the general direction of the Council and is paid a nominal salary plus a small sum for clerical assistance.

The Council appoints a Board of Trustees consisting of three members to administer the permanent fund of the Society. The editor and associate editors also are appointed by the Council to serve a term of one year or until their successors are appointed.

Activities

The objectives of the Society are carried out through annual and sectional meetings, committee activities, correspondence, and issuance of publications. The annual meeting of the Society is held in March in conjunction with the North American Wildlife Conference. At this meeting financial and business affairs of the Society are discussed and committee reports presented. A Wildlife Society member serves as general chairman of the technical sessions of the North American Wildlife Conference and helps arrange the program. Other Society members serve as chairmen and discussion leaders of the various technical sessions at this conference, or present technical papers.

The six Sections of the Society either hold program meetings of their own to serve local interests or collaborate with Sections of the American Fisheries Society and/or regional fish and game commission groups in staging annual sectional wildlife conferences.

Several Society committees carry out their programs in cooperation with similar committees of the International Association of Game, Fish and Conservation commissioners. Among the committees of the Wildlife Society are those on Employment, Job Standards, and Exoties. The Employment Committee gathers statistics on the enrollment and the number of recent graduates of more than 50 fish and wildlife training institutions, determines the number of graduates obtaining employment in the wildlife field and endeavors to aid both job applicants and employers by maintaining employment desks at the national and sectional wildlife conferences. The Committee on Standards strives to raise the standards of wildlife jobs and to de-

velop higher professional levels throughout the wildlife field.

In addition to electing outstanding individuals to honorary membership, the Society also encourages and recognizes meritorious work in the wildlife field by its award program. The Aldo Leopold Medal, highest honor which the Society can bestow on an individual, is granted each year to the person judged by the committee to have contributed most to the wildlife management profession. Among the recipients of this award have been such well-known conservationists as Carl Shoemaker, Ira N. Gabrielson, O. J. Murie, Harold Titus, Clarence Cottam, and Hoyes Lloyd.

Awards are also presented each year, to the writers of publications judged best in the terrestial and aquatic wildlife fields and to the individual or agency believed to have contributed most to conservation education through films, art work, publications, or other media.

The Wildlife Society is affiliated or associated with the Natural Resources Council of America, the International Union for the Protection of Nature, the National Research Council, the American Association for the Advancement of Science, the American Committee for International Wild Life Protection, the National Watershed Congress, and the International Science Foundation. Affiliation with and representation in such national and international groups facilitates the coordination of conservation programs and encourages attention to wildlife problems at local, national, and international levels.

The *Journal of Wildlife Management*, official organ of the Society, is a scientific periodical appearing in January, April, July, and October. It contains a wide array of articles on fish and wildlife ecology, research, management methods and techniques, and, in addition, important committee reports and reviews. This Journal has become a "must" for technicians, administrators, fish and wildlife professors, students, and others who wish to keep abreast of the rapidly growing field of wildlife management. Botanists, ecologists, zoologists, mammalogists, foresters, ichthyologists, and others also find articles of interest in this Journal.

"The Wildlife Society News," as the name implies, is a news letter issued quarterly for distribution to the Society members. The News deals with internal affairs of the Society and provides members with an outlet to sound off on matters of policy, Society activities, and needs of the wildlife profession.

Currently a manual on wildlife techniques is being prepared under the general editorship of a Society member and consideration is being given to the issuance of a new publication series — Wildlife Monographs.

Additional information on membership, available publications or details on Society activities may be obtained from the Secretary-Treasurer, c/o Fish and Wildlife Service, Washington 25, D. C.

Forest Land In Texas Has Increased in Last 20 Years

East Texas has almost one million acres more forest land than it had in 1935 because so much land once cleared has reverted to forest, according to a recently completed survey of the state's forest resources.

The survey was made by the Southern Forest Experiment Station of the Forest Service in cooperation with the Texas Forest Service, the Champion Paper and Fibre Co., the Southern Pine Lumber Co., International Paper Co., and the Olin Mathieson Chemical Corporation.

Forests cover 11,655,800 acres of a total land area of 19,038,700 acres in the commercial timber belt of East Texas. The most heavily timbered portion is in the southeast.

The volume of all merchantable trees totals 7 billion cubic feet. Over half of this is softwoods, mainly southern yellow pines with some cypress and redcedar.

The volume in saw timber trees totals 26 billion board feet. Softwood saw timber volume has risen 26 percent since 1935 in southeast Texas but has declined 46 percent in the northeast section, leaving the total practically unchanged. The big increase in softwood growth in southeast Texas reflects the great progress made in protection and improved forest practice during the past 20 years.

Fire, insects, disease, and other natural agencies annually kill about 50 million cubic feet of timber in East Texas, of which nearly 0.2 billion board feet is saw timber. When losses from such causes are allowed for, net growth in East Texas forests amounts to 440 million cubic feet of timber annually, including 1.7 billion board feet of saw timber.

In 1954, when the latest cutting statistics were compiled, logging removed 302 million cubic feet of timber, including 1.5 billion board feet of saw timber. The Texas timber resources support 70 large sawmills, several hundred portable sawmills, 3 woodpulp mills, and over 50 miscellaneous wood-using plants. The 3 pulp mills are now using about half as much pine annually as all of the sawmills together.

A full report of the survey may be obtained from the Southern Forest Experiment Station, 2026 St. Charles Ave., New Orleans 13, La.

Timber Stand Improvement in Ozark Forests—an Appraisal After 15 Years

Eugene Shoulders
Southern Forest Experiment Station,
Forest Service,
U. S. Department of Agriculture

DURING 1934 and 1935 Civilian Conservation Corps crews carried out timber stand improvement work on about 60,000 acres of pine and hardwood sites on the Ozark National Forest in north Arkansas. Since many foresters have questioned the practicality of stand improvement on these sites, an appraisal was made in 1950 to determine how treatments had affected the composition and growth of stands. The appraisal was limited to the Sylamore District in Stone County, but the findings probably apply to the other areas as well.

In brief, the appraisal showed that most of the work was thoroughly justified by improved growth. It also suggested ways of achieving still better results at lower costs.

Stands and Treatments

In 1934 the stands on the Sylamore District were essentially two-storied; they contained mature, over-mature, and decadent veterans in the overstory, and seedlings and young saplings in the understory. The general objective of stand improvement work, on both pine and hardwood sites, was to release the younger trees.

The pine sites were on ridges and south and west slopes. They supported an overstory of thrifty sawlog- and pole-size shortleaf pine (*Pinus echinata*) mixed with assorted low-grade and cull hardwoods (S.A.F. types 75 and 76).[1] The understory was predominantly low-quality hardwoods with scattered pine reproduction. Treatment here consisted chiefly of girdling hardwood culls that were overtopping established pines or white oaks of good promise. However, not all cull trees were removed even when they were interfering with such desirable trees. Some were retained as den trees or to produce seed and game food, and others were kept because they contained crosstie material, although no market then existed for ties.

The hardwood sites were on north and east slopes with deep soils. Prior to treatment, they contained a light understory of seedlings and small saplings and an overstory of mature and overmature white oak and other hardwoods, a considerable portion of which were cull. The types represented were post oak—black oak, white oak—red oak—hickory, and white oak, corresponding to S.A.F. types 40, 52, and 53. Most of the hardwood understory trees were of sprout origin, but they were generally free from decay and suitable for crop trees. Treatment here consisted of liberating desirable hardwoods from overstory culls and cleaning around selected crop trees spaced approximately 17 feet apart. Both measures, of course, were not always necessary in individual stands. On the whole, the cull overstory was treated more heavily than on the pine sites, because more saplings were already established. However, considerable cull overstory was left for game food and white oak seed, and submarginal tie trees were also retained.

On both the pine and hardwood sites, the entire merchantable overstory was kept, though much of it was past maturity.

Appraisal Methods

In 1950, 72 pairs of temporary 0.2-acre plots were located five chains apart along selected General Land Office survey lines that had served in 1934-35 as boundaries between treated and untreated areas. One plot of each pair was 2 chains inside the treated area, and the other was the same distance inside the untreated area. The selected lines ran across topography for at least a mile and sampled all aspects.

Ridge tops and south or west slopes were classed as pine sites, north and east slopes as hardwood sites. This classification agreed very well with the actual distribution of desirable growing stock on the study plots.

All stems larger than 0.5 inch d.b.h. were tallied. A current d.b.h. of 7.5 inches was arbitrarily selected to divide understory from overstory. Trees in both divisions were classified as to their economic desirability. For overstory trees, the classifications were:

Hardwoods

Good—contained one Grade 2 log[2] or better.
Poor—did not qualify for "good" but contained at least one Grade 3 log[2] 10 feet long.
Cull—lacked a Grade 3 log.

Pine

Good—contained one Grade 2 log[3] or better.
Poor—did not qualify for "good" but contained at least one Grade 3 log.[3]
Cull—lacked a Grade 3 log.

Understory trees were graded as either good or poor, depending on their likelihood of developing into good overstory trees.

In this grading, trees were judged by their stem quality only, and not by species or the site on which they were found. As might be expected, most of the good hardwoods proved to be white (*Quercus alba*) or red oaks (*Q. falcata*, *Q. coccinea*) on hardwood sites. Among

[1] Committee on Forest Types. Forest cover types of North America. Society of American Foresters. 1954.

[2] U. S. Forest Products Laboratory. Hardwood log grades for standard lumber: proposals and results. U. S. Forest Serv. Forest Products Lab. D1737, illus. 1949.

[3] Reynolds, R. R., Bond, W. E., and Kirkland, B. P. Financial aspects of selective cutting in the management of second-growth pine-hardwood forests west of the Mississippi River. U. S. Dept. Agric. Tech. Bul. 861, 118 pp., illus. 1944. (See pp. 43-45.)

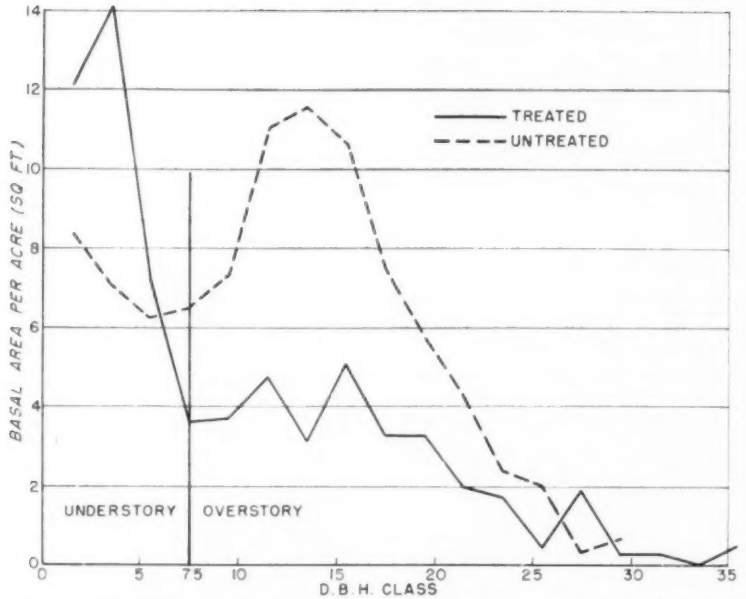


FIG. 1.—Distribution of total basal area (pine and hardwood plots combined) by d.b.h. classes, 1950. By reducing the amount of cull overstory, treatment greatly stimulated understory development.

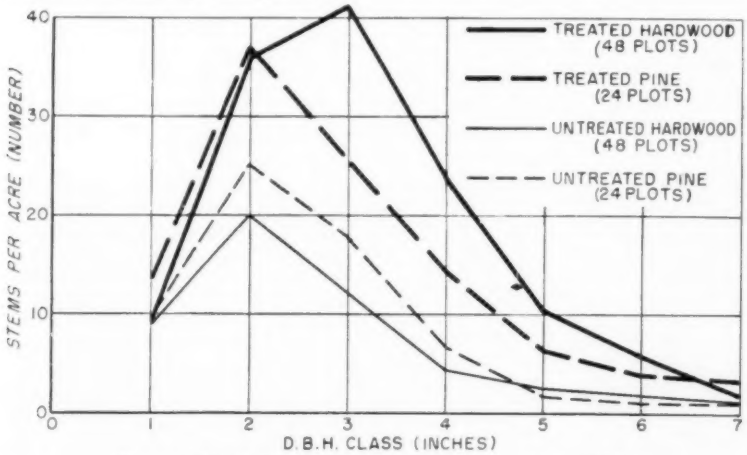


FIG. 2.—Distribution of desirable understory stems, 1950.

the poor hardwoods were many black (*Q. velutina*), blackjack (*Q. marilandica*), and post oaks (*Q. stellata*), blackgum (*Nyssa sylvatica*), and hickories (*Carya* spp.) on pine as well as hardwood sites.

Development of Treated Stands

The appraisal showed that the 1934-35 treatments greatly reduced the 1950 basal area of poor and cull components of the overstory, stimulated the growth of released trees, and improved the understory composition in species and quality (Fig. 1). Both hardwood and pine types responded in the same way, but the improvements in the pine stands was less marked because treatments there were generally lighter.

Hardwood sites.—The most striking difference between treated and untreated hardwood stands was in the amount of good basal area present in 1950. The treated stands supported 16.2 square feet of good basal area per acre, while the untreated stands contained only 9.1 feet.

The greatest part of the improvement occurred in the understory. Treated stands by 1950 had developed 8 square feet of basal area in good trees, while untreated stands had only 2.6. The advantage of treatment appeared in both the numbers and the size of the understory trees. Thus the treated stands averaged 126 good understory stems per acre in 1950, while the untreated stands had only 52. The advantage of the treated stands in both size and quality of understory trees can be seen in Figure 2.

Growth of good stems in the overstory was only slightly improved by treatment. By 1950, treated stands had developed 8.2 square feet of good basal area per acre as compared to 6.5 for untreated stands.

The important change in the overstory was the drastic reduction in undesirable stems — treated stands now contain less than half as much basal area in poor and cull stems as untreated stands (Table 1). It was this curtailment of useless overstory, and the consequent development of a promising understory, that made the treatments successful. Under the denser overstories, understory development was extremely slow, and mortality from suppression may now be balancing new growth. Where overstories were light, good understory growth was maintained for 15 years and may be expected to continue for some time longer. The understory in treated stands still contains many inferior stems, but it also has enough good trees to ensure an adequate stand of high-quality crop trees.

Though it was not possible to make statistical comparisons of the relative values of liberation and cleaning, it was apparent that liberation, which involved the removal of undesirable overstory trees, was the most effective. Cleaning around selected understory crop trees, when applied in conjunction with adequate liberation, stimulated growth more than liberation alone. Where clearing was not accompanied by adequate overhead release, diameter growth was not appreciably promoted. Too, the understory trees removed in cleaning generally sprouted vigorously, and

TABLE 1.—BASAL AREA PER ACRE BY QUALITY CLASS AND FOREST TYPE, 1950

Stand component in 1950	Hardwood sites		Pine sites	
	Treated	Untreated	Treated	Untreated
	Square feet			
Overstory				
Good	8.2	6.5	12.5	13.0
Poor	14.0	37.4	17.4	31.2
Cull	5.7	22.4	9.7	24.1
Total	27.9	66.3	39.6	68.3
Understory				
Good	8.0	2.6	5.9	3.0
Poor	29.6	21.9	24.5	22.8
Cull[1]	—	—	—	—
Total	37.6	24.5	30.4	25.8
Total stand				
Good	16.2	9.1	18.4	16.0
Poor	43.6	59.3	41.9	54.0
Cull	5.7	22.4	9.7	24.1
Total	65.5	90.8	70.0	94.1

[1]All understory trees not of good quality were classed as poor.

these sprouts soon nullified the effects of cleaning.

Pine sites.—On the pine sites the development of the understory was also stimulated by the removal of the low-quality overstory (Table 1). The improvement, however, was less pronounced. Thus by 1950 the treated pine stands had 104 desirable understory stems per acre, with a basal area of 5.9 square feet. The untreated stands had 65 desirable stems—a basal area of 3.0 square feet.

The pine treatment was clearly too conservative. The few openings created by girdled hardwoods were too small for the establishment of pine reproduction. Such openings were usually taken over by poor hardwoods, the sites being generally adverse to the development of good hardwoods. One additional factor, the retention of considerable high-quality overstory pine in 1935, contributed to the smaller response on the pine sites.

Many of the pines released in 1935 were soon resuppressed by sprouts from treated hardwoods. Such sprouting practically nullified the response of pines shorter than 10 feet, though taller pines maintained their dominance. Sprouting was particularly serious where cleaning was attempted; the small trees removed in this operation sprouted profusely, without exception as to species. The trees removed in liberation were larger, and only chinquapin, red maple, blackgum, and the elms sprouted enough to compete with released stems.

Overstory-understory relationship.—The general dependence of understory development upon overstory removal is graphed in Figure 4. This linear regression of current understory on current overstory basal area was derived from all 144 sample plots, after it was found there were no significant differences

FIG. 3.—The understory trees in both of these pictures are the same age, but those on the left were released from overstory competition in 1935.

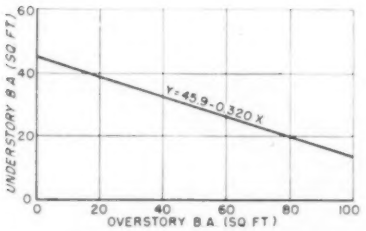


FIG. 4.—Relation in 1950 of total understory basal area per acre (Y) to total overstory basal area (X) in pine and hardwood types in north Arkansas.

among individual regressions for treated and untreated plots on pine or hardwood sites (4 regressions).

The regression confirmed what was readily apparent on the ground: that any openings were utilized by the developing understory. The true effect of release is somewhat greater than is revealed by this appraisal, because the understory improved in quality as well as in basal area. Some further understory development is anticipated, especially where the overstory is light.

Value of the Treatments

Yearly growth of about ½ square foot of desirable basal area per acre on the hardwood sites and 1/6 square foot on the pine sites can be attributed to the treatments. There is no universally valid ratio for converting basal area in small trees, or in trees of mixed sizes, to board feet, but a reasonable approximation can be secured by using 70 board feet (International ¼-inch rule) per square foot of basal area. From this ratio, it is apparent that treated hardwood sites developed a 500-board foot advantage over untreated sites in 15 years. In pine stands, the 15-year gain from treatment was 170 board feet per acre. These estimates are conservative, because the ratio considers only the first 16 feet of bole (the first portion to become merchantable). Most of this basal area growth is either in white oak or shortleaf pine; $30 per M bd. ft. is a very conservative estimate of stumpage prices for these species. Thus it may be calculated that by 1950 the benefits of treatment were worth at least $15 per acre on hardwood sites and $5 per acre on pine sites.

The timber stand improvement was accomplished at an average rate of 1.2 acres per 8 hour man-day on 13,800 acres of the Sylamore District. Production averaged 1.1 acres per man-day in hardwood areas and 1.5 acres per man-day in pine areas. The foreman in charge of operations attributed the difference in labor requirements to the more open condition of the pine types and a lighter treatment.

Production in stands given only liberation was at a rate of 1.3 acres per man-day for all types combined. Cleaning, where required, was applied to 1.0 acre per man-day. Stands requiring a combination of liberation and cleaning (this treatment embraced over half the area) were treated at a rate of 1.1 acres per man-day. In comparing these rates of production, it must be remembered that each treatment was intended for a different stand condition. Stands designated for cleaning alone required careful selection of suitable crop trees and the removal of large numbers of small trees—both time-consuming jobs. On areas given combination treatments, the overstory had retarded understory development and made cleaning relatively easy. Thus cleaning alone required more labor than cleaning plus liberation.

Total costs averaged $4.39 per acre. Of this total, $2.80 was for labor, $0.53 for supervision, and $1.06 for overhead, which included transportation, equipment, reconnaissance, and reports.

Stand improvement work recently completed on similar sites on the Sylamore Experimental Forest, using experienced labor, was accomplished considerably faster than the work performed by CCC crews in 1934-35. Production averaged 3.3 acres per 8 hour man-day of effective treating time. The increased efficiency offset the higher wages, so that total cost per acre was less than in 1935. This recent timber stand improvement followed harvest of all overmature timber and consisted of liberation from overstory culls accompanied by limited cleaning in the understory. It was applied to approximately 2,200 acres of forest land.

Summary and Conclusions

The development of these Ozark forests in the first 15 years following stand improvement both justifies the work and indicates how quality growth could have been further increased.

The benefits are most noticeable in the understory, which has improved greatly in basal area and in stem quality. The improvement was in more or less direct proportion to the amount of overstory removed. Cleaning around understory crop trees also stimulated growth, but only when done in conjunction with liberation from overstory competition.

The removal of large amounts of cull timber of course improved the composition of the overstory and increased the growth of desirable overstory trees somewhat. Nevertheless, the overstory will not show radical improvement until it is reinforced from the rapidly developing understory.

Hindsight indicates that understory development was retarded in treated stands by the retention of merchantable and cull overstory trees. Much greater benefits would have been realized had a harvest of mature merchantable timber preceded treatment, had more culls been removed, and had chemicals been used where heavy sprouting was likely. (Of these alternatives, only the second was feasible in these stands in 1935.) Despite the circumstances which tend to reduce benefits, the original cost of $4.39 per acre has been amply justified by at least $15.00 per acre gain on hardwood sites. On pine sites the $5.00 gain barely repaid costs without interest. This was partly because the sites were poorer, but mainly because the stands were not opened up enough to allow pine reproduction to become established.

Seed Source and Nursery Effects on Yellow-Poplar Plantations

Gustaf A. Limstrom and Raymond F. Finn
Silviculturist and research forester, respectively,
Central States Forest Experiment Station, U. S. Forest Service

NURSERYMEN have long noted the differences in the development of individual yellow-poplar (*Liriodendron tulipifera* L.) seedlings growing under identical environmental conditions in their nurseries. They have also noted that the density of the seedlings in the seedbeds has a definite effect on stem diameter but a negligible effect on seedling heights. Recent experiments established to test seed sources of this species have confirmed these observations. In seedbeds of uniform density, then, what accounts for the wide differences in heights among year-old individual seedlings? Are these differences due simply to the age of the seedlings (that is, to the date of seed germination), to differences in "microsites," or to differences in seed origin and quality?

To find the answers to some of these questions a number of tests were made at the Marietta State Tree Nursery,[1] Ohio, in 1955. To learn the carry-over effects of seedling diameter and height on the development of field plantings, data from a 5-year-old plantation of this species in southeastern Ohio were also analyzed. The results of these tests and analyses are reported here.

Seedbed Density

In one seedbed of fairly uniform density, consisting of seedlings grown from seed of a single tree, 20 sample plots 1 foot square were randomly established to test the effects of seedbed density on seedling height and diameter. On June 7, 1955, four plots each were thinned to densities of 15, 30, and 45 seedlings per square foot, and four were left unthinned. A ½-foot isolation strip around each plot was thinned to the same density as the surrounded plot; each plot then was located in the center of a 4-square-foot area of uniform density. At the end of the growing season, on October 3, the seedlings in each plot were counted; the height of each seedling and the stem diameters 1 inch above ground were also measured. At that time the average densities were 13.8, 26.2, and 37.7 seedlings per square foot on the plots that had been thinned to 15, 30, and 45 trees per square foot, and 50.0 trees per square foot on the unthinned plots.

The results show a striking relationship between stem diameter and seedbed density (Fig. 1) but practically no relation between seedling height and seedbed density. Average stem diameter, for example, varied from 1.3/20 to 3.5/20 inch for changes in density from 80 to 10 seedlings per square foot. Average length of tops, on the other hand, varied only from 7.55 to 7.78 inches for a change in density from 80 to 10 seedlings per square foot.

Germination Date

To determine the effect that germinating date might have on seedling size, 70 separate square-foot plots were sampled. These plots were established in a seedbed sowed with seed from 35 different trees and seven different sources. The plots were examined on May 12, May 26, June 7, July 1, and October 3. At each examination, the seedlings were marked with rubber bands of different colors, so that by the end of the season, it was possible to record the number and size of surviving seedlings by germination periods.

The results reveal that although more than 75 percent of the seedlings germinated before May 26, there are significant differences in the diameter and length of stems among seedlings germinating at different periods. Nearly half the small seedlings germinated before May 26, but only about 15 percent of the larger seedlings germinated after May 26 (Table 1). The number of seedlings less than 5 inches in top length that germinated after May 26 was less than 9 percent of the total number produced (Table 2). Even though some of these may be equal in growth potential to the tall seedlings germinating earlier in the season, the loss that would result by grading according to size would be exceedingly small.

Seed Sources and Seed-Trees

The 70 sample plots established at the Marietta Nursery to determine effects of germination date on size of seedlings served as well for comparing seed sources and seed-trees within sources. When analyses of stem diameter were made (after adjustments were made for differences in seedbed density) no significant differences among sources were found. The tests, however, disclosed significant differences among six different sources of seed in the average heights of 1-year seedlings. Similar tests from stock produced at the Vallonia Nursery, Indiana, including the same sources as well as six others, yielded identical results. Moreover, while height differences among sources were found to be significant, the variations of progenies from different seed trees within sources were equally significant.

In fact, the variations in seedling heights among seedlings from a single seed tree are often greater

[1]The authors wish to acknowledge the excellent cooperation of Nursery Superintendent Donald Richter of the Division of Forestry, Ohio Department of Natural Resources, in the production of planting stock used in these tests.

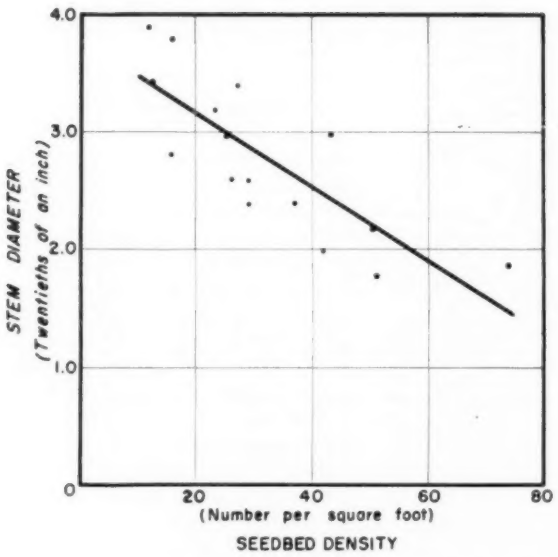


FIG. 1.—Relationship of stem diameter of 1-0 yellow-poplar seedlings 1 inch above ground line to density of seedbed at end of growing season. (Correlation coefficient, r = — .7957)

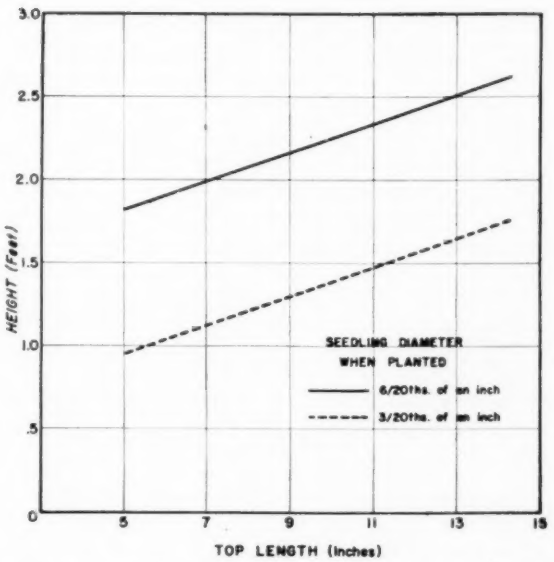


FIG. 2.—Relationships of seedling diameters and top length of 1-0 yellow-poplar at time of planting to tree height in field 5 years after planting.

than the mean differences in heights of progenies among seed trees and seed sources. These wide differences are perhaps due chiefly to chance differences in parentage brought about by incidental pollination; as is well known, self-pollination is common in yellow-poplar. Carpenter and Guard (*1*) obtained much better seedling growth from seeds developed by cross-pollination than those developed by open, or uncontrolled, pollination. They also observed that most of the open pollination is carried out by bees, working among flowers in the same tree. It is quite likely then that most of the larger seedlings produced from a given lot of yellow-poplar seed are the progenies of seed resulting from cross-pollination.

From these results, it is apparent that seed from almost any source may result in the production of at least a few exceptionally tall seedlings. Ranking of two or more yellow-poplar stands as sources of seed for reforestation should therefore be based chiefly on the relative number of tall seedlings consistently produced under similar seedbed conditions. An evaluation of this kind is suggested in Table 3. The specific ranking is based on a comparison of the percentage of tall 1-0 yellow-poplar seedlings produced. Three sets of ranking are presented: two for progenies of seed collected from 12 different sources in 1952 and grown at two different nurseries, and one set for progenies of seed collected in 1954 from six sources and grown at one nursery. The "class" ranking is based on the relative positions in the specific ranking; for example, a specific ranking of 1 to 4 is considered good, where 12 sources are compared, rankings from 5 to 8 are classified as medium in ranks, and ranking from 9-12

TABLE 1.—RELATION OF GERMINATION PERIOD TO QUANTITY AND SIZE OF 1-0 YELLOW-POPLAR SEEDLINGS PRODUCED

Cumulative germination to:	Total number produced	Small seedlings produced[1]	Large seedlings produced[2]	Average stem diameter[3]	Average length of tops
	Cumulative percent	*Cumulative percent*	*Cumulative percent*	*20ths of an inch*	*Inches*
May 12	29.0	7.1	33.5	6.7	14.2
May 26	78.5	48.8	84.6	5.8	12.2
June 7	89.8	64.3	95.0	4.3	9.0
July 1	98.4	92.9	99.5	2.8	5.7
September 1	100.0	100.0	100.0	2.9	4.5

[1]Seedlings less than 5 inches high.
[2]Seedlings 5 inches high or higher.
[3]One inch above ground.

TABLE 2.—RELATION OF GERMINATION PERIOD TO PERCENTAGE OF THE TOTAL NUMBER OF SEEDLINGS PRODUCED IN EACH OF FOUR HEIGHT CLASSES

Cumulative germination to:	Height classes (inches)				Totals
	Less than 5	5-10	10-15	Larger than 15	
	Cumulative percent	*Cumulative percent*	*Cumulative percent*	*Cumulative percent*	*Cumulative percent*
May 12	1.2	5.2	11.9	10.7	29.0
May 26	8.4	22.0	26.1	22.0	78.5
June 7	11.1	27.3	28.2	23.2	89.8
July 1	16.0	30.4	28.8	23.2	98.4
September 1	17.2	30.8	28.8	23.2	100.0

TABLE 3.—RANKING OF SEED SOURCES IN AVERAGE HEIGHT OF 1-YEAR YELLOW-POPLAR SEEDLINGS, FOR TWO NURSERIES AND 2 YEARS OF COLLECTION

Seed source	Vallonica Nursery seed collected 1952		Marietta Nursery seed collected 1952		1954	
	Ranking Numerical	Class[1]	Ranking Numerical	Class[1]	Ranking Numerical	Class[1]
Cannelton, Ind.	1	Good	4	Good	1	Good
Oxford, Miss.	2	Good	1	Good	--	--
Dexter, Ind.	3	Good	3	Good	--	--
Marietta, Ohio	4	Good	8	Medium	2	Good
Asheville, N. C.	5	Medium	7	Medium	--	--
Hardin County, Ill.	6	Medium	5	Medium	3	Medium
Dowagiac, Mich.	7	Medium	9	Poor	--	--
Zaleski, Ohio	8	Medium	11	Poor	6	Poor
Jonesboro, Ill.	9	Poor	2	Good	--	--
Athens, Ohio (A)	10	Poor	6	Poor	5	Poor
Athens, Ohio (B)	11	Poor	12	Medium	4	Medium
Orange County, N. Y.	12	Poor	10	Poor	--	--

[1]Class rankings are based on position in specific ranking.

are considered poor. It should be noted that the "class" rankings of most sources are strikingly consistent for the three sets of comparisons.

Field Planting Results

The foregoing sections have been presented to point out the principal causes of differentiation in the growth of yellow-poplar seedlings in the nursery. Of prime importance is whether the growth of trees in the field reflects the differences exhibited in the nursery. Will the taller seedlings in the nursery be the taller, faster growing trees in the field? No data on this subject are yet available from old plantations, but results from a 5-year-old plantation are of interest. Located in southeastern Ohio, this plantation was established on an old field in the spring of 1951, using yellow-poplar seedlings produced at five different nurseries but from a single seed source. Each of the 125 seedlings studied was measured at the time of planting, and its position in the row recorded. This made it possible to correlate subsequent development of each tree with its size when planted. The range in heights of trees in this plantation at 5 years was from 0.5 to 5.4 feet. By the use of multiple regression analyses it was possible to test the effects of both stem diameter and length at time of planting, each independent of the other, on the heights of seedlings 5 years after planting. The results of these analyses are illustrated in Figure 2. It can be seen that both length and diameter of seedlings have an important effect on later tree height. For example, tree height at 5 years for seedlings 6/20 inch in diameter was about 1 foot greater than those seedlings that were only 3/20 inch in diameter at time of planting.

For a change in original stem length from 5 to 15 inches, the increase in total height was also 1 foot in 5 years. In other words, the estimated height at 5 years for seedlings 6/20 inch in diameter and 15 inches tall is almost three times that estimated for seedlings only 3/20 in diameter and 5 inches tall. Because these sample measurements represent the range in size of average 1-0 yellow-poplar planting stock, it appears that the effects of stem diameter and stem length on the total height 5 years after planting may generally be expected to prove about equal.

Significance of Results

The important effect of stem diameter of 1-0 yellow-poplar seedlings on initial survival has been reported in a previous publication (*3*). The results of the present study indicate that the effects of stem diameter and top length of seedlings on early growth are about equal. These studies also show that stem diameter of seedlings is strongly associated with density of the seedbed, while relative differences in height of seedlings growing under similar environmental conditions in the nursery are apparently due chiefly to differences in seed quality.

From these generalizations it should not be inferred that nursery culture has no effect on height growth. The average height of yellow-poplar seedlings varies among nurseries. For example, in five different nurseries, average heights of 1-0 yellow-poplar seedlings produced from the same seed source varied from 3.2 to 7.9 inches (*3*). Quite often, also, the average height of yellow-poplar seedlings on the borders of seedbeds is greater than that of seedlings growing in the interior parts of the seedbed. Although there may be "micro-site" differences in the interior parts of a seedbed, the possibility that they alone account for the wide difference in heights of individual seedlings seems remote. Lateral root development of yellow-poplar in seedbeds is widespread enough to extend beyond the aerial space usually occupied by each seedling, and the roots of many seedlings are commonly intertwined. The significant differences in heights of seedlings from a large number of localities and seed trees grown in randomly assigned places in the same seedbed indicate that these differences in height are due at least in part to seed origin and quality. The continued superiority of tall seedlings over short seedlings five years after field planting also suggests a genetic influence on growth.

Variations in seed quality are due to differences in parents and to differences in environmental conditions affecting development of the embryo. Among the environmental factors, weather conditions (precipitation, wind, and temperature), light, insects, diseases, and site are perhaps the most important. Density of the stand and position of tree in the stand (crown class) may be regarded as secondary factors because of their influence on light, soil moisture, and wind velocity. Guard and Wean (*2*) found little difference in the percentage of sound yellow-poplar seed between trees growing on poor soil and fertile soil, and between growing in open and closed

stands. They found, on the other hand, a higher percentage of sound seed in trees 15 inches d.b.h. or less than in larger trees; also a slightly higher percentage of sound seed in the highest part of the crown than for the middle or the lowest parts of the tree crowns. Whether these relationships of seed quality apply in a similar way to seedling growth has not yet been determined. Although it is quite widely known that weather conditions play an important part in the quantity and viability of seed produced in different years, there is little information on its relation to the percentage of fast-growing progenies produced.

Results of the tests reported here indicate that variations result partly from differences among stand sources and partly from differences within stands. At least from the standpoint of juvenile growth, the differences among seed trees within a stand—and indeed differences among individuals from the same seed tree—are at least as significant as the differences among sources. The great difference in growth between progenies developed from self- and open-pollination, as reported by Carpenter and Guard (*1*), is most likely the best explanation of these great variations within stands. If only local stands are compared, the differences among them may be due largely to differences in the extent of cross-pollination. If these differences vary from one year's collection to another, they may be due to chance variation in cross-pollination; if, on the other hand, they are consistent, such variables as density or number of seed trees, their size, the quality of nectar or parental differences may be accountable.

From the foregoing discussion it is apparent that the separation or isolation of environmental and genetic factors influencing the quality of yellow-poplar seed is difficult. Until controlled pollination becomes practical, or until some measure of the quality of the seed itself can be found, our best assurance of good plantations is a careful selection of seedlings to be used in the planting job.

Applications

Planting stock grades for yellow-poplar, based mainly on stem diameter and designed to assure good initial survival, have already been published (3). To assure good growth, and to improve the quality of future plantations, an even more rigid selection of seedlings is necessary. A selection based on both stem diameter and length will help to achieve this goal. We cannot, however, set up specific top-length standards of universal application; they must be set up by each nurseryman each year, and if soil fertility varies in the nursery, they must be set up for each seedbed; that is, unless the proportion of tall seedlings in all seedbeds are quite similar, separate top-length grades should be established for each seedbed.

Nurserymen often sow yellow-poplar seed from two or more of the same sources year after year. If a small quantity of seed from each source is sowed separately in two or more randomly chosen plots in the same seedbed, the comparative percentages of tall seedlings can be easily obtained. If this is repeated two or more years, and this percentage is consistently higher for one source, it is quite likely that this source would be superior to the others. In other words, if all sources are of local origin, the source with the greatest percentage of tall seedlings for each of two or more years is most likely the best source of seed for large-scale use in the locality.

The best way to improve the quality of our plantations and thereby improve the quality of subsequent natural regeneration is to practice more rigid culling of nursery-run planting stock.

Literature Cited

1. CARPENTER, I. W. and A. T. GUARD. 1950. Some effects of cross-pollination on seed production and hybrid vigor of tuliptree. Jour. Forestry 48: 852-855.
2. GUARD, ARTHUR T., and ROBERT E. WEAN. 1941. Seed production in the tulip poplar. Jour. Forestry 39:1032-1033.
3. LIMSTROM, G. A., R. F. FINN, and G. H. DEITSCHMAN. 1955. Planting stock grades for yellow-poplar. Jour. Forestry 53:28-32.

Alexander J. R. Harding (1934-1956)

Alexander J. R. Harding, 22, of Bellmore, N. Y., died recently in an airplane crash in Florida. He was serving as a lieutenant in the U. S. Air Force.

Lt. Harding received a B.S. degree from the New York State College of Forestry in June 1955. In May 1954 he became a member of the Society of American Foresters.

Pocket Gophers as a Cause of Mortality in Eastern Washington Pine Plantations

Richard Wm. Dingle
Department of Forestry and Range Management,
State College of Washington, Pullman

IN THE SPRING of 1952 the Department of Forestry and Range Management of the State College of Washington began a research project to determine effective and economic methods of artificially regenerating stands of ponderosa pine (*Pinus ponderosa*) on denuded and nonproducing forest areas in eastern Washington.

Each year for the purposes of the project four plots, subdivided into six subplots, have been planted at five locations in the section of Washington east of the Cascade summit. At least once a year survival counts have been made on these plots, and efforts made to determine the cause of mortality for individual trees which fail to survive.

Several species of wild animals were discovered to be responsible for the destruction of planted trees. Deer and pocket gophers have seriously reduced the survival of planted trees on the lands of the Biles Coleman Lumber Co. in Okanogan County, the Columbia Lumber Co. near Kettle Falls, and the Cascade Lumber Co. near Ellensburg. Deer have eliminated many of the trees planted on Deer Park Pine Industry lands in Spokane County.

The most serious damage from wild animals, however, occurred on the lands of the J. Neils Lumber Co. near Glenwood, Washington. There on the Plateau Block in Klickitat County a form of the western pocket gopher (*Thomomys* spp.) attacks planted pine trees under ground while the same trees may be damaged above the ground by bark-chewing porcupine and top-nipping deer and rabbits (Fig. 1).

Inasmuch as damage from deer and porcupine and methods of controlling these animals have received attention from other quarters, and because the damage from pocket gophers seemed quite serious and had received little attention, a need for further study and testing of control methods was indicated.

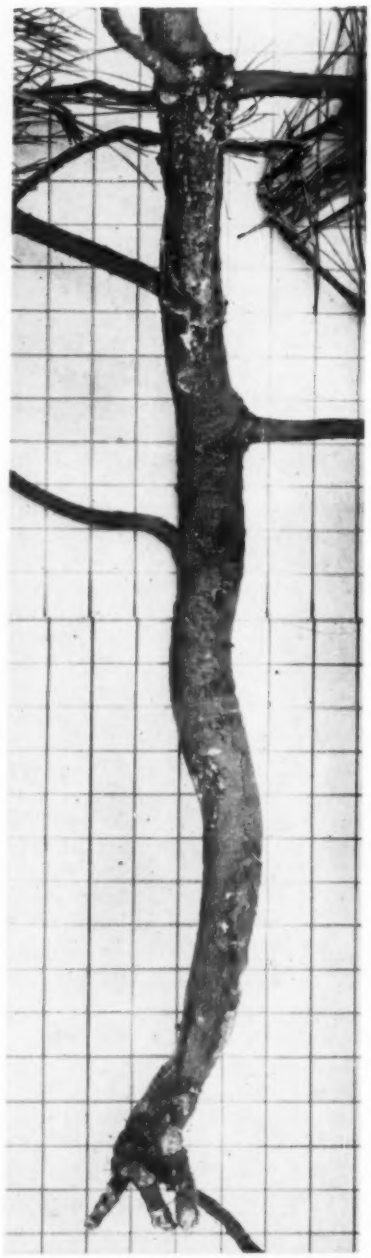


FIG. 1.—Two types of injury commonly found on planted seedlings in eastern Washington. Porcupine injury is shown on the main stem at the top of the photograph, while the roots have been pruned off by gophers.

Nature of Damage by Pocket Gophers

Damage from pocket gophers, serious in plantations varying from one to ten years of age, was detected in most cases by the death of the above-ground portion of the tree. Mortality occurred when a sufficiently large proportion of the roots had been taken by the gophers (Figs. 2 and 3).

Occasionally 1st-year trees are completely removed, leaving only a fresh gopher mound in the planting spot. The gopher sometimes seems to be interrupted in the process of removing a tree for just the tip of it may be left sticking out of the worked soil in the planting spot (Fig. 4).

Extent of Gopher Damage

The seriousness of the damage caused by pocket gophers can best be shown by a few examples.

1. In 1948 the plantation of ponderosa pine established an the Plateau Block of the J. Neils Lumber Company was eminently successful. Survival at the end of the second growing season was 92 percent. Three years later gopher damage began to appear. By 1954 survival in the plantation had been reduced to 60 percent. Pocket gophers were the major cause of mortality during this period.

2. In 1954 many of the subplots established on the Plateau Block showed a 100 percent survival at the end of the first growing season. All subplots showed a survival of 84 percent or better. Examination after the second season showed that some mortality from gopher damage occurred on 18 of the 24 established subplots. Seven subplots showed only from 40 to 60 percent survival.

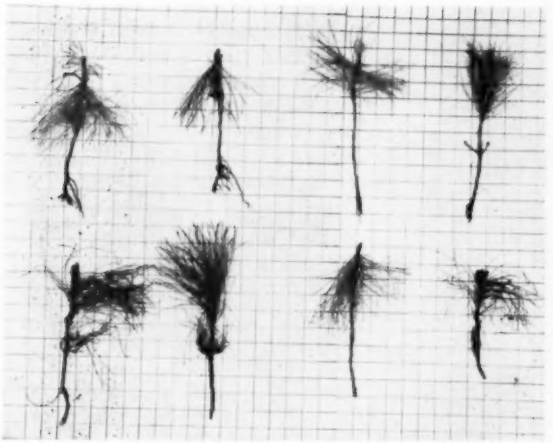


FIG. 2.—Gopher injury to 1st-year planted pine. All trees were killed. Note the variation in severity of root pruning Tree at lower right had a large portion of its stem as well as all the roots removed.

FIG. 3.—Trees killed by gophers in the 7th year after planting. Total age was nine years.

3. The year 1952 was a poor one for plantation survival. Average survival ranged from 40 to 60 percent. By the end of the 1955 growing season survival on some plots had been reduced to 25 percent—largely due to pocket gophers.

4. Apparently pocket gophers also find scotch pine roots palatable. Some of the scotch pine plantations established for Christmas tree production have been seriously damaged by pocket gophers despite the fact that the resinous roots of pines in general have been supposed by some to be distasteful to gophers.

Description of the Gopher

The mammal which caused the damage to pine plantations near Glenwood, Washington, is portrayed in Figure 5. It is a small animal that looks very much like a stout mouse, with large front feet armed with strong claws to aid the animal in digging. The gopher is completely vegetarian in its eating habits and, according to Moore and Reid, is fond of such roots as those of dandelion.

It does not seem likely that an animal having a preference for bitter-tasting dandelion roots would find it distasteful to eat resinous-flavored pine roots. Nevertheless, according to Webster[1] it is generally thought that the gopher does not feed on pine roots but

[1]Letter from Milton H. Webster, district agent, Rodent and Predator Control, Fish and Wildlife Service, U. S. Department of Interior, Seattle 4, Washington, July 14, 1954.

FIG. 4.—A gopher-killed tree which has been almost completely removed. Approximately 2½ inches of the top remain.

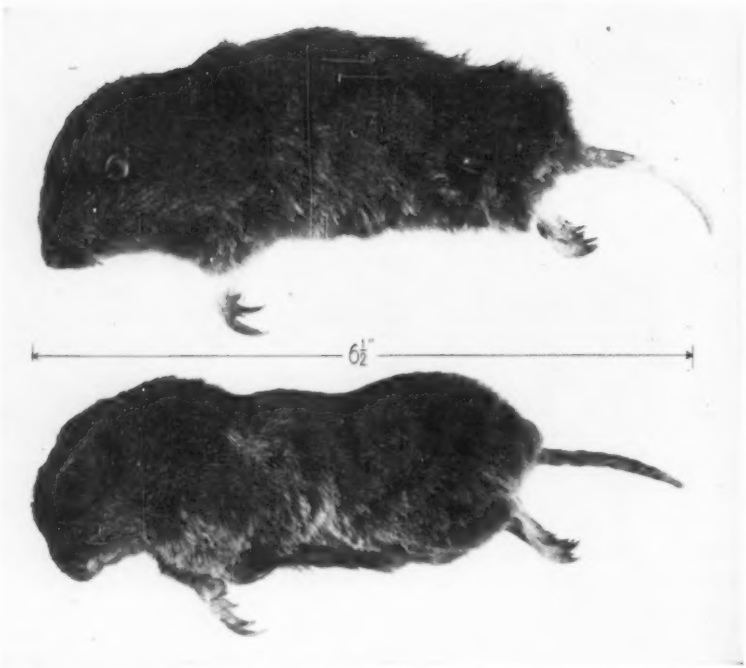


FIG. 5.—Species of Western Pocket Gopher indigenous to the Plateau Block, J. Neils Lumber Co., Klickitat County, Washington.

only cuts them when they obstruct his tunneling activity. This opinion would seem to be refuted to some extent by the evidence found on the Plateau Block and elsewhere in eastern Washington.

Control of Damage

Because damage from pocket gophers seemed to be a limiting factor in the establishment of ponderosa pine plantations in the Klickitat area, it seemed wise to explore the possibility of reducing the gopher population prior to planting. Control methods were found to be well described by Moore and Reid (*3*) and by the State College of Washington (*4*). In addition, Homer Ford of Yakima, Washington field agent in charge of Rodent and Predator Control for the Fish and Wildlife Service, lent his assistance for the job of laying out and treating control plots.

In the fall of 1954, four 1-acre treated plots and four ¼-acre check plots were laid out on the Plateau Block. Treated plots were large enough to contain a buffer strip approximately 50 feet wide around a ¼-acre plot from which survival data reported here were obtained. The objectives of this phase of the experiment were: (1) to test the effectiveness of recommended methods applied to potential forest planting sites, (2) to obtain some measure of the cost of application of such control methods, (3) to determine the economic feasibility of control in terms of increased survival versus cost of control, and (4) over a long period of time to determine the need for and the cost of maintaining gopher control.

The plots laid out in the fall of 1954 were planted in the spring of 1955. First-year survival of trees planted on the control plots averaged 12 percent better than on the check plots. The differences were consistent, as can be seen in the following table. According to appropriate statistical analysis they were highly significant.

TABLE 1.—FIRST-YEAR SURVIVAL OF 1955 PLANTATIONS OF PONDEROSA PINE NEAR GLENWOOD, WASHINGTON

Plot no.	Survival percentage	
	Gopher control	No treatment
1	81	72
2	75	61
3	77	63
4	78	71

Description of Control Method

Control was affected by baiting tunnel systems with pieces of strychnine-treated diced carrot in the manner recommended by Moore and Reid (*3*) and in W. S. C. Extension Mimeo. 1365 (*4*) and illustrated in Figure 6.[2]

This method is reputed to be 95 percent effective in reducing gopher populations. The 1-acre plots required from 165 to 380 baits each and from ½ to 1 man-day per acre to treat them. An effort was made to get at least three baits in each main tunnel system on the 1-acre plots. The intensity of baiting is illustrated in Figure 7.

Costs of from 4 to 8 man hours per acre for gopher control on these four plots will have to be charged off against the amount of the increased survival which can be expected as a result of gopher control. This may seem to make the increased survival quite expensive. However, if it is not profitable to control the gopher population in a heavily infested open area, it is doubtful that plantations of ponderosa pine will succeed, for in such open areas gopher-caused mortality will soon reduce the planted stand to less than satisfactory stocking.

Following initial treatment of infested areas by baiting with strychnine-treated baits, rebaiting or trapping can be used to eliminate the few animals which persist or reinfest the control area. Wire traps and their placement in gopher runways as described by Washington State College (*4*) are illustrated in Figures 8 and 9.

Since gophers move around under the snow in winter. Treated areas can be repopulated. The need for maintenance by rebaiting or trapping can be reduced if the initial treated area is large enough to include a buffer strip around the plantation. Nevertheless, in order to be effective, some maintenance of control from year to year will be needed. After crown closure occurs in the plantation, gophers are not likely to be a serious problem since they are

[2]From W. S. C. Extension Mimeo. 1365 (adapted).

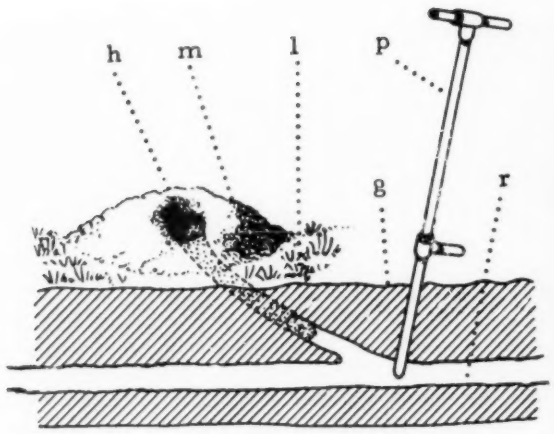


FIG. 6.—Method of baiting gopher tunnels with strychnine treated root baits. Terminus (*h*) of lateral (*l*) in mound (*m*). Probe (*p*) is used to find main tunnel (*r*) and to make a hole (*g*) for insertion of bait. Hole is then covered at ground level to prevent entrance of light and air into tunnel.

FIG. 7.—The intensity of baiting is illustrated by white markers indicating points of bait placement.

primarily meadow dwellers, thriving in open areas rather than in forests. (*1* and *2*.)

Indirect control of gopher populations on overgrazed open areas might be partially obtained by the elimination of grazing. This is true because the gopher feeds primarily on fleshy rooted plants usually belonging to pioneer plant associations. Such indirect control takes advantage of natural succession crowding out the favorite food plants of the gopher, thereby forcing him to move. This type of control by itself, however, is not conducive to rapid reestablishment of forest cover on denuded areas.

Summary and Conclusions

In the conduct of an experiment in the artificial regeneration of ponderosa pine in eastern Washington it was observed that several species of wild animals were associated with reductions in plantation survival. Animals associated with mortality were deer, porcupine, pocket-gophers, and rabbits. Pocket gophers were particularly important causes of mortality in several locations. Gopher control methods recommended for use on agricultural lands were tested as to their applicability to forest planting sites by the establishment of four control plots and four check plots in an area heavily infested with pocket gophers. First-year survival indicates that the methods tested caused a sufficient decrease in gopher population to bring about higher survival on the control plots than on the checks.

Conclusions which can be drawn from this study are: (1) On certain denuded forest sites in eastern Washington, pocket gophers may cause serious reductions in the survival of pine plantations from 1 to 10 years after planting. Damage to individual trees in the plantation may consist of serious root pruning on the one hand or complete removal of the tree on the other. Reductions in plantation survival by pocket gopher damage has amounted to as much as 12 percent in a single growing season or 30 percent in two or three years.

(2) Baiting tunnel systems with strychnine-treated root baits requires 4 to 8 man hours per acre when intensity of baiting required varies from 165 to 380 baits per acre. Placement of three poisoned root baits per tunnel system results in sufficient control of pocket gophers to be reflected in increased survival of planted trees on control plots over check plots. (3) In the case studied the control plots averaged 12 percent higher survival at the end of the first growing season than the check plots.

FIG. 8.—Type of wire trap used in catching gophers not eliminated by poisoned root baits.

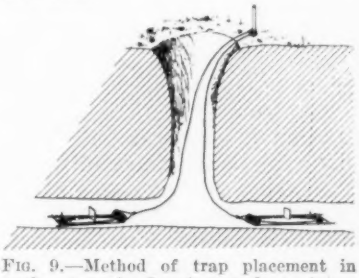


FIG. 9.—Method of trap placement in gopher tunnel. Opening made to introduce traps is left uncovered and open.

Literature Cited

1. HALL, E. R. 1946. Mammals of Nevada. Univ. of Calif. Press.
2. INGLES, L. G. 1947. Mammals of California. Stanford Univ. Press.
3. MOORE, A. W. and E. H. REID. 1951. The Dalles pocket gopher. U. S. Department of Agriculture circular No. 884.
4. STATE COLLEGE OF WASHINGTON. 1952. Pocket gopher control. Extension Mimeog. No. 1365.

Managing Hardwoods for Quality Increment[1]

S. R. Gevorkiantz
Forester, Lake States Forest Experiment Station[2]
Forest Service,
U. S. Department of Agriculture

THE MOST IMPORTANT hardwood timber in the Lake States comes from the northern hardwood type. The economic value of this type, which is usually dedicated to sawlog production, is very high. Sugar maple, its main component, is tolerant of shade, responds quickly to release, and reproduces prolifically. The chief associated species, which vary in numbers on different sites, are eastern hemlock, yellow birch, basswood, elm, and beech. Less common species occurring in mixtures are red maple, white ash, red oak, white pine, white spruce, balsam fir, and white-cedar. Yellow birch, basswood, and sugar maple are the most valuable species.

Cutting and fires have reduced the original area of hardwood timber and its average size. According to our most recent surveys, about 8 million acres of northern hardwoods (excluding nearly denuded areas) are classified as commercial forest land. About 70 percent of this area supports timber of less than saw timber size and only one-eighth of the area contains old-growth stands. The advanced second-growth stands are now composed of remnants from past cuttings and younger trees that have grown to pole and small sawlog size. The stands originally harvested only for sawlogs are now in much better condition than those where cuttings for other products removed also a large portion of trees below sawlog size. Both old-growth and the majority of second-growth stands contain high proportions of deformed and cull trees and trees of sprout origin, all of which are highly detrimental to proper stand development. Management, by means of continuous partial cuttings, is the only answer to maintaining or restoring the productive capacity of most northern hardwood stands in the Lake States.

The first management studies in the Lake States were conducted chiefly in the old-growth forests. This was necessitated by their high economic value and the desire to find ways and means to extend their life until the existing second-growth stands could begin to yield the sizes needed for sawlog production. Twenty-year experimental results of different cutting methods tried in such stands are now available.[3] They indicate quite conclusively the effectiveness of partial or selection systems of cutting for putting the old-growth stands in good productive condition. Methods of managing second-growth hardwoods are now under test. Several experiments are being initiated to study their care and response to management. Whatever the final results of these studies may show, it is already clear that marking aimed at elimination of defective and undesirable trees is essential for improving their growth and the quality of future yields. Inequalities in age and tolerance among the component species in the northern hardwood type, together with the relative ease of obtaining natural regeneration of tolerant hardwoods under cover, make selection and improvement cuttings very applicable to second-growth hardwood stands.

Partial cuttings, however, require several essential conditions before they can be put into practice. To begin with, good markets must exist to permit integrated utilization of both low- and high-quality wood. Site conditions, too, must be favorable to sustain good growth over long periods of time. Furthermore, a proper stand structure, or a distributional pattern of trees by different diameter classes, must be developed to provide operable cuts and to ensure a continuous flow of products of different kinds and sizes over a period of time.

Under favorable site conditions and with good markets for different products, the management of hardwoods becomes a matter of proper tree selection. Clearly recognizing that a stand is only as good as the trees which compose it, the timber manager, to grow timber of better quality and value, must know how to recognize present and potential individual tree vigor and quality.

Selection For High Net Growth

Stand improvement and release. —Obtaining high net growth per acre is the first essential of hardwood management. Careful selection of the growing stock and the elimination of undesirable and poor-risk trees at the time of each cutting will eventually increase net growth to the production level attainable on the given site. This is why the quality of site is so important.

This potential level of production, which may vary from stand to stand, must be clearly recognized by management. For one thing, it controls the length of cutting cycle. Disregarding poor sites, the average gross production of northern hardwoods, which includes both net growth and the loss through decay and mortality, is usually consid-

[1]Presented at the meeting of the Southern Ontario Section, Canadian Institute of Forestry, at Toronto, April 17, 1956.

[2]Maintained at St. Paul 1, Minnesota, in cooperation with the University of Minnesota.

[3]Eyre, F. H., and W. M. Zillgitt. Partial cuttings in northern hardwoods of the Lake States. U. S. Dept. Agric. Tech. Bul. 1076, 124 pp., illus. 1953.

ered to be about 225 board-feet per acre per year in the Lake States. This is generally obtained in most old- and advanced second-growth stands averaging 17,000 and 8,000 board-feet (Scribner) gross, per acre, respectively. Under management that tries to maintain the merchantable level of cut stands at 6,000 board-feet per acre net (starting out perhaps with a level of 4,000 board-feet in advanced second-growth stands), the annual yields of about 200 board-feet per acre net are obtained easily even at an early stage of management.

The pattern of this net growth, believed to be attainable through management, is most revealing. It is shown schematically in Table 1, adapted from results of partial cutting as reported by Eyre and Zillgitt. This pattern of growth is the sum and substance of what we generally expect from improvement cuttings, and should, therefore, be studied carefully by everyone engaged in management of hardwood stands.

The most important points to consider here are:

1. Improvement cuttings greatly increase the net production per acre. Deformed, defective, and low-vigor trees do not contribute much to net growth. In uncared for old-growth stands the net growth is only one-fourth of the gross production. More than one-half of the growth is wasted in the form of mortality alone.

2. There is a considerable gain due to release. The tempo of ingrowth is greatly increased by cutting, and the acceleration of the diameter growth, particularly of tolerant species, is well pronounced.

3. By far, the greatest gains come from proper selection of crop trees and through liquidation of poor-risk trees which contribute so heavily to mortality.

Desirable stocking.—The tables assume, of course, that proper stocking is maintained as partial or improvement cuttings are made. As mentioned previously, the desirable levels of stocking for merchantable trees are in the neighborhood of 6,000 board feet per acre net. According to Eyre and Zillgitt, advanced second-growth stands can be handled under uneven-aged management with about 4,000 board-feet net, or when about 45 trees per acre 10 inches and larger in diameter are present in the stand. In terms of basal area per acre, which is a better measure of stocking, they state that about 68 square feet per acre is needed in trees 10 inches and over in diameter in old-growth stands and about 50 square feet in advanced second-growth. In addition, from 30 to 60 square feet of basal area per acre of saplings and pole-sized trees, well distributed by smaller d.b.h. classes, should be maintained to provide a continuous flow of young growth as the older or bigger trees are being removed by management cuttings.

TABLE 1.—GAINS IN GROWTH IN OLD-GROWTH HARDWOODS THROUGH SELECTION CUTTING

Items relating to growth	Annual growth or loss per acre (Board-feet, Scribner)	
	No management	After selection cutting
Gross growth on merchantable trees	213	[1]135
Acceleration due to release	—	45
Better growth on better trees	—	22
Ingrowth	12	23
Gross production	225	225
Mortality	128	20
Cull loss	40	5
Total loss	168	25
Net growth	57	200
Net gain due to selection cutting	—	143

[1]Growth of the residual stand without extra growth attributable to selection cutting.

The distributional pattern of trees by diameter classes to meet these desirable basal area levels is given by Eyre and Zillgitt as follows (Table 2):

TABLE 2.—DESIRABLE STAND DISTRIBUTION AFTER CUTTING

D.b.h. (Inches)	Trees per acre	
	Old growth	Advanced second growth
	Number	*Number*
2- 4	202	852
5- 9	65	82
10-14	28	29
15-19	17	16
20-24	8	—

At optimum stocking, the growing space provided by cutting is effectively utilized to render the maximum production of desired products per acre. Maximum production may be accomplished at somewhat different levels of good stocking, depending on the length of the cutting cycle, the product, and the size of trees desired. The levels of 6,000 and 4,000 board-feet per acre, representing the net scale of residual stands, would also vary depending on site, merchantability, and proportion of large trees left in the stand.

Evaluation of growth capacity of individual trees.—The first step in marking is careful evaluation of risk. The timber marker must learn to recognize windfirmness, defect, and other factors contributing to potential mortality. In addition, he must know the silvical requirements of different species, and he must be able to anticipate the impact of cutting at each level of crown canopy. During the entire marking process he is continually involved in recognizing the crown efficiency of individual trees and, more important, how each tree will benefit from the anticipated release.

Crown efficiency.—Ideally, each tree retained in the stand should benefit from partial cuttings. Aside from being sound, it must also have an adequate crown or photosynthetic capacity. This capacity of the crown is generally proportional to the weight of foliage. However, since this weight cannot be determined on standing trees it must be obtained indirectly by estimating, for example, length of crown, its diameter, and its relative density.

Growth is an index of crown efficiency and can be arbitrarily expressed as

$$g = \frac{(D+d)^2\ (H+h)}{n}, \text{ where}$$

g = annual increment

D = present tree diameter at breast height—inches

H = present merchantable height—feet

d = diameter growth in inches, arbitrarily set as a goal to be attained during one or several cuttings

h = corresponding change in merchantable height—feet

n = number of years required to attain d and h

The crown efficiency will vary with the crown size and its ability to respond to release. As a rule, very long crowns are detrimental since they tend to shorten the length of the merchantable bole. Very wide crowns, too, seldom respond to release. Short and narrow crowns may take too long to produce timber of desirable size even after release. Much depends on tolerance to shade and site. Although the question of crown efficiency and its recognition is of considerable importance, no studies have been made to place this subject on a formal or factual basis. Without such formal studies we shall continue to depend on personal judgment.

The approach to the study of crown efficiency requires a research procedure that is seldom followed. The first step should be to classify crowns into different categories. One method for doing this is shown in Figure 1, which provides for nine groups of crown form and size as related to total height. The next step would be to study the performance of these crowns in both cut and uncut stands to determine what constitutes the optimum crown size and how different crowns respond to cutting. Quite recently a study like this has been initiated in second-growth hardwoods with the object of developing by means of periodic remeasurement some practical way of evaluating crown efficiency that would fit the requirements of marking practice.

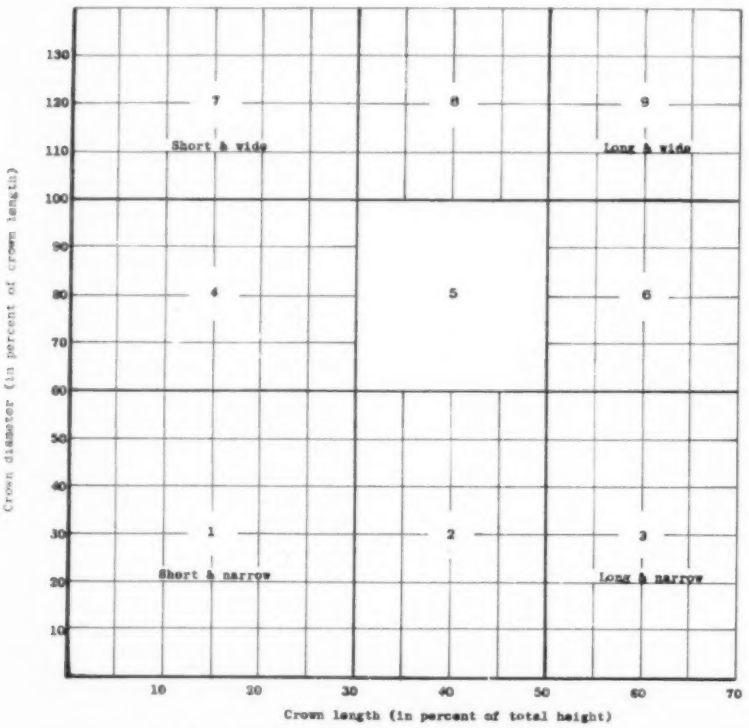


FIG. 1.—Classification of hardwood crowns.

So far, only rules-of-thumb have been used which are rather general and vary somewhat with individuals. Most rules imply that a balanced crown is one with a length between 30 and 50 percent of the tree height and a diameter from 60 to 100 percent of the crown length. Such crowns would fall in class 5, as shown in Figure 1. More studies are needed before the optimum crown size for different species can be established as an observed fact.

Even with a rule-of-thumb, however, a timber marker is able to discriminate against undesirable crowns. Considerable attention, of course, should be paid in every case to crown density which frequently makes up for a deficiency in crown size. Furthermore, one should be able to anticipate the growth response of crowns of different dimensions to release. Sugar maple and hemlock, for example, even those with poorer than average crowns, respond well to release when more light is introduced into the stand.

The photosynthetic capacity should be studied also in relation to different layers of crown canopy. For example, trees with inadequate crowns occupying the main canopy in even-aged stands seldom, if ever, recover after release, particularly if they belong to light-demanding species. On the other hand, young trees with relatively small crowns that are considerably below the main canopy, respond well to release, especially if they are tolerant to shade.

Selection for Quality and Value

The object of management cuttings is to shift growth from undesirable trees to those of low risk and good quality. Marking for vigor must go hand in hand with marking for quality. The high price for good-quality hardwood logs speaks for itself and provides the greatest impetus to hardwood management. Hardwood stands will probably never disappear completely but the shortage of large and good quality timber already exists in the Lake States, as witnessed by the price for veneer logs which is three times as high as the price for the remaining woods run of logs.

In managing hardwoods, however, not only the quality of merchantable trees must be recognized but also the quality potential of younger trees that are left to grow.

Evaluation of index of quality.—The Forest Products Laboratory has now developed a satisfactory scheme for grading hardwood logs.[4] The scheme was not specifically designed, however, for the purposes of tree classification. For rough grading of standing timber, tree grades rather than log grades are more desirable. Furthermore, a quality classification also must consider trees below merchantable size. Finally, tree grading must be rapid to justify its application on marking jobs. Although many attempts are being made to classify tree quality in the woods, much research is still needed to replace personal judgment.

Several criteria of tree quality are now being investigated. Most of them are modifications of the basic principles developed by the laboratory. One method now being tried by the Lake States Forest Experiment Station in connection with the cutting level studies in second-growth northern hardwood stands recognizes the importance of surface defects and the length of clear cuttings but, for simplicity, disregards the effect of size and the relative position of logs in the usable portion of the stem. The classification requires a careful scrutiny of the lower half of the merchantable bole on all four sides to determine the number and the combined length of clear cuttings between any visible defects that are known to degrade lumber in the mill. This examination includes at least 10 feet of the merchantable bole. Since the lower part of the stem includes better grades of logs, it is more suited for quality evaluation.

Both the average and the maximum length of clear cuttings are generally correlated with the yield of good quality lumber. In a study of tree quality, one could adopt, then, as an index of tree quality, an expression that would incorporate the combined length of clear cuttings in the lower half of the merchantable stem and the corresponding total number of these clear cuttings. The main feature of such a quality index is the relative clearness of the most valuable portion of the tree bole. This is true for both young and merchantable trees. In young trees the merchantable height can be regarded as the stem below the crown base, of which at least 10 feet is examined for visible signs of defect and deformity. A few relatively long clear cuttings would imply good present or potential quality, while a large number of short sections would indicate poor quality. Although tree quality, interpreted in this way, is rather general, it should provide all that a timber marker would need in selecting his "cut" and "leave" trees.

The procedure described above is designed only for research studies. The application phase, which comes later, will have to employ simpler and more rapid schemes. A simpler method for evaluating tree quality in old-growth stands, for example, is being investigated in northern Michigan on the Dukes Experimental Forest. In this approach, the second quarter of the merchantable length is considered the grading zone. This zone is divided into four vertical faces. The number of these faces that are free from visible defects determines the grade of the tree. A tree with four clear faces in the grading zone is called a prime tree; one with three clear faces is considered grade one, etc. Preliminary studies indicate a close correlation between these grades and the value of lumber manufactured.

Classification for value.—the quality index is also an index of value. Both stumpage and lumber price per thousand board-feet should correlate with it. This relationship will differ, of course, for different products, but the general trend of values will follow the increase in quality index. This invites an economic study to ascertain how close the quality index approximates the actual lumber recovery so that the index can be used for cruising for value. In timber estimating the chief concern has been with volume and site quality. The time is rapidly approaching when we could also differentiate among stands in regard to quality and value, not only in general but rather specific terms.

To do a better job of recognizing vigor and quality of hardwood trees, better tree classifications than are available today are needed. It is much easier to select trees for removal than it is to choose the ones to be retained because of their intrinsic ability to develop into valuable timber. As yet, no completely satisfactory tree classification systems are available. Some schemes confound vigor with value; others do not go beyond the recognition of present dominance. A classification of crown vigor that would recognize the response of different species to cutting and their crown efficiency for utilizing the growing space provided by release is urgently needed. A better understanding of optimum space per tree for each species will result in better marking than complete reliance on a set level of basal area for the entire stand, which naturally varies with age, distribution of trees by diameter classes, composition, and the past history of the stand.

Growing Realization of Need for Good Management in Hardwood Stands

Adequate transportation and good markets for different rough products come before management. It is the market for poor quality wood, however, which provides a proper setting for the management of hardwood forests. In the Lake States northern hardwoods are easily accessible and can be handled by relatively small timber sales. What are needed most are better markets for inferior species and logs. As stated previously, there is enough hardwood fiber, but a definite shortage of good quality logs. Before good quality wood can be grown however, poor timber must be cut.

[4] Forest Products Laboratory. Hardwood log grades for standard lumber. Rept. No. D1737, 15 pp., 48 tables, illus. 1953. (Processed.)

The need for good quality logs will become more pressing as time goes on. The present shortage of veneer and No. 1 sawlogs will continue unless special efforts are made to improve the quality of present-day stands. This can be accomplished through good management extended over large areas.

The rapid rise in population and the continually increasing demands for timber products, coupled with the general shortage of softwood fiber throughout the central and northeastern portions of the United States, will all tend to make wood-using industries more conscious of the hardwood supplies. While the demand for good quality hardwood timber will never decline, there are definite indications that the utilization of low grade and inferior hardwoods will greatly increase in the future. Thus, the outlook for better management of hardwoods is now more encouraging than ever before.

In the meantime, more must be learned about hardwood management, particularly in the second-growth stands. We must strive more for quality growth, which will continue to be in demand despite the offsetting trends in technological advances. To achieve it, an approach to the problem on some factual and systematic basis is necessary. Only a few possibilities in this systematic approach are indicated in this paper. Better measures and methods of evaluating quality increment will be developed as more research findings become available. The apparently widespread realization of the need to maintain quality in hardwood stands basically suited for integrated utilization through selection cutting will provide additional incentive for research along these lines.

Conservation Education Association Meets at Clemson College

"What are the characteristics of a good conservation education program in a local school system?" was the main topic for discussion of the third annual national conference of the Conservation Education Association meeting at Clemson College, Clemson, S. C. August 25-29.

One-hundred and twenty registered delegates participated in the conference. Leaders in the field of education dominated the program, but representatives from most conservation agencies were present. Forestry was represented by the U. S. Forest Service; the state forest services of Arkansas, South Carolina, and Texas; and Clemson College and A.F.P.I.

The group entered into an energetic program that included general meetings, work shops, and field trips.

The general meetings and work groups were enlivened by illustrations of methods for presenting conservation education through the school systems. Field trips were taken to the Coweeta Hydrologic Station, Franklin, N. C., the Twelve-Mile Creek Pilot Small Watershed in Pickens County, South Carolina, and the Clemson College Land Management area.

Some of the more important conclusions of the association were:

1. There is a need for more teachers adequately equipped to present conservation to their classes.

2. More encouragement and support are needed from the school administrators.

3. Conservation agencies have the responsibility for supplying suitable and factual material to the teachers.

The CEA is a young but energetic group that recognizes the importance of carrying the message of conservation to pupils at the elementary and secondary grade levels. The CEA can do much to promote forestry if it receives the active support of the profession through memberships and otherwise, and is also provided factual subject material suitable to its purpose.

Anyone desiring to join this young organization is invited to send his $5 to Dr. Wilson Clark, CEA secretary-treasurer, Eastern Montana College of Education, Billings, Mont.

CEA will meet in 1957 at Higgins Lake, Mich. in August.

MARLIN H. BRUNER,
Clemson College.

Some Statistical Needs in Forest Economics

Charles H. Stoddard
Washington, D. C.

OVER the years foresters have become prodigious collectors of all manner of data on many of the important aspects of forestry. Detailed attention has been given to forest land acreages, timber volumes, growth and drain, and other aspects of the condition of basic resources by the Forest Surveys of the U. S. Forest Service. The most recent effort, the Timber Resource Review, has added materially to our quantitative measurements of the current American forest situation. Though there are still many gaps in land and timber data, we are at the point where we have a fairly adequate knowledge of the essential details.

In keeping with the fields of agriculture and industry, statistical data on lumber, pulp and paper production, and some other finished forest products, covering such items as wages paid, value added through manufacture, number of employees in manufacturing industries, industry profits, carloadings, and prices of finished and semi-finished goods, are regularly reported and recorded. Such familiar sources as the *Survey of Current Business*, annual *Statistical Abstract*, *Agricultural Statistics*, *Census of Business*, *Census of Agriculture* and publications of the Bureau of Labor Statistics all contain some data on these various phases of forest products generally in their finished or semi-finished form. The trade associations likewise publish excellent current production data on finished output.

However, between the time timber is severed from the stump and the time it is sold to a processor for manufacture, value is added through the expenditure of labor and the use of machinery. During this raw material stage many important areas of information are covered inadequately or not at all from a statistical standpoint. It is this aspect of forest economics with which this paper is concerned.

An example of the serious lack of continuous and substantive data on rough forest products is the 1954 *Yearbook of Agriculture* devoted to "Marketing" which failed to include any mention of the raw material derived from forest lands save brief mention of naval stores. Although foresters have been saying for years that "timber is a crop," the Department of Agriculture fails to include it as such in most of its important farm programming.

Little need be said to justify the value that additional statistical material can add to this or any other field. In today's economy where business and government are engaged in continual efforts to maintain healthy and prosperous business conditions, measurements of rates of change of various sectors are completely dependent upon accurate, regularly collected data. It is taken for granted that in most other branches of our economy—agriculture, most industry, labor, and consumer interests—large bodies of useful data must be available. No case can be made for collection of statistics as an end in itself—and this has sometimes been done—but certainly where clearly objective factual measurement will contribute to greater knowledge and understanding of a situation there can be little doubt as to the value of the effort. Furthermore, a free economy assumes that producer and consumer are fully appraised of changes in the economy in order that they may make informed decisions. To the whole field of forest economics, research and sound basic data are essential raw materials.

Because forest activity is a business as far flung geographically as agriculture, data gathering becomes a difficult and extended effort. Yet for years foresters have said, "Timber is a crop," while failing to insist on finding out how significant a crop it really is. Production of various kinds of round and rough forest products, points of origin, the prices at which they are bought and sold, employment generated, the wages paid, and the costs of woods production are only a few of the long list of items about which we lack statistical data. Although we have much information on the number of people and enterprises engaged in primary agriculture and the price received for farm products, nothing comparable is collected in forestry.

To obtain a more adequate picture of primary timber production activities many types of data now collected for agriculture would suffice. Without attempting to assign in detail agency or other responsibility for this task a simple enumeration may be useful at this point. The following incomplete list includes some of the kinds of data that would be useful; other types will suggest themselves.

1. In classifying types of farms under the Census of Agriculture *timber* or *tree farms* should be given a special grouping. This would provide a measure of the significance of continuous managed tree growing in the total forest land use picture as well as giving recognition to this special type of farming. Game farms, shooting preserves, trout farms, and other wildlife areas used commercially for other than usual farm crops should also be shown.

2. Complete enumeration of logging contracting firms and independent timber producers should be tabulated in the Census of Business in the same manner as other types of business. Included should

be data on gross and net income, number of employees, total wages paid, and value and volume of output.

3. In the Census of Agriculture farm income from forest products is shown, but data revealing wages from off-farm woods work and income from sale of forest products cut from stumpage bought from others are intermingled but not shown separately

4. Current prices of forest products should be collected and disseminated with market reports in the same manner as other farm products in order to keep forest owners and timber producers informed of developments in supply and demand. It is recognized that stumpage prices are more difficult to obtain and present. Further study may be required before actual data can be disseminated. Sawlogs, pulpwood, railroad ties, posts, piling, and rough lumber are all subject to standard grading rules and may be classified for pricing fairly simply.

5. While data on employment, income, and wages in wood processing industries and company logging camps are collected, none are obtained for self-employed woods workers or those employed in "gyppo" operations. These comprise a large portion of woods workers in the eastern states.

6. Current and prospective market information should be made available through reports comparable to those now published by the U. S. Department of Agriculture for many other farm commodities.

The desirability of including parity calculations in forest products price reporting has been advanced by some and questioned by others. Recognized as a useful but highly imperfect yardstick for measuring relative changes in the purchasing power of a commodity, parity prices have been calculated for many decades by the U. S. Department of Agriculture on about 130 commodities. The concept of price supports as related to parity began in the 1930's and programs have been limited chiefly to a dozen or so "basic" products.

Forest owners who are only occasional sellers of timber products usually have no basis for judging the adequacy of currently offered prices, in the experience of the writer. Since standing timber can be withheld from the market when prices are low in relation to other commodities, a parity price would be a useful standard for many sellers. But because historical price data for base periods are so inadequate, parity calculation would be difficult. That parity calculations would lead to price supports is highly improbable since cut timber is difficult to store for any length of time. In any case timber does not press on the market the minute it is ripe. Though difficult to determine, parity calculations would be helpful to owners and sellers.

That professional foresters have not urged various agencies to undertake collection of these data long before this may possibly be indicative of the lack of intensive forestry until recently. That enrichment of our field of knowledge should receive the support of everyone interested in forestry activities would appear obvious. But strangely enough, complete agreement does not exist in all quarters. Price reporting in Georgia is said to have been discontinued under pressure. Only in Oregon, Wisconsin, and New Hampshire are continous efforts made to supply current information to producers. In those states the extension foresters have pioneered in this undertaking with little encouragement. In recent legislative proposals forest products price and market reporting was specifically provided for, but met defeat for a variety of reasons.

Until these and other data needs are met, understanding of the operation of our forest economy will continue to be inadequate. To the extent to which foresters and forest landowners continue to lack basic data just so long will we be unable to carry out research needed to solve difficult problems. And so long as sellers lack the market knowledge possessed only by buyers will this sector of our economy fall short of being completely free. When these conditions are met, timber will be generally recognized and given status as a crop.

Alaskan Science Conference Held in Juneau

The Alaska Chapter of the S.A.F. participated in sponsoring the Seventh Alaskan Science Conference in Juneau September 17-30. Co-sponsors were the Alaska Section of American Society of Civil Engineers and the Alaska Division of the American Association for the Advancement of Science.

The conference was attended by over 260 scientists from Alaska, Canada, the United States, and a number of European countries.

The basic aim of the conference was to promote the exchange of information concerning scientific research in Alaska. Individual sessions were devoted to anthropology, agriculture, biology, engineering, fisheries, forestry, geophysics, geology, and geography. A. P. Caporaso, Alaska Forest Research Center, was chairman of the forestry sessions.

Plans were made to initiate a Keep Alaska Green campaign. The S.A.F. Chapter will sponsor a program aimed at interesting Alaskan boys in studying forestry.

Notes

1955 Christmas Tree Data[1]

The states bordering Canada produce most of our Christmas trees. Any one of these states, except North Dakota, harvests more than it can consume. The surplus, therefore, goes to other states. For example, the trees harvested from Montana in 1955 were shipped to at least a dozen states and Cuba. That year Montana produced 3,234,894 and shipped 2,854,750 Christmas trees, 465,500 of which went to Texas; 346,750 to Iowa; 342,000 to California, 299,250 to Missouri, 270,750 to Kansas, 266,000 to Oklahoma, 213,750 to Nebraska, 166,250 to Illinois and so on.[2]

Data for other states are admittedly estimates. However, production figures by regions for 1955 are shown in Table 2.

Most of the 25 million plus trees harvested came from privately owned lands, since available data indicate only about 19 percent are cut from public lands—federal (4 percent, see Table 3) state and county (13 percent), and other (2 percent). Of the 81 percent from private lands, 35 percent of the Christmas trees came from farm woodlands, and 46 percent from nonfarm or industry lands.

Imports shown in Table 4 together with the U. S. production for 1955 bring the total number of Christmas trees distributed in the United States in 1955 to about 37 ¾ million.

Christmas tree plantations.—While 87 percent of the nation's Christmas trees came from natural wooded or pasture lands, the remaining 13 percent were harvested from established plantations which yielded 3⅓ million trees in 1955.

A survey indicated that approximately 225,500 acres are now planted soley for the growing of Christmas trees. Seventy percent of this area is owned by farmers. New York alone reported 100,000 acres established for Christmas tree production. There are numerous records of successful Christmas tree plantations and 20 states have issued publications dealing with this subject. Also, eleven state or regional Christmas tree associations have been organized as well as a national association.

[1]The 1955 Christmas tree data contained herein were compiled to replace and supplement data contained in AIB 94, "Christmas Trees—the Tradition and the Trade." (Note: The free supply of this bulletin is exhausted but it may be had from the Government Printing Office, Washington, D. C. at 15 cents per copy.)

[2]From Research Note No. 28, Intermountain Forest and Range Expt. Sta., Ogden, Utah, March 1956.

TABLE 2.—PRODUCTION OF CHRISTMAS TREES IN 1955 BY REGIONS

Region	Number
Northeast and Middle Atlantic States (11 States)	4,832,120
Lake States (3)	7,875,000
Central States (5)	820,000
Southern States (14)	3,624,000
Prairie States (4)	32,000
Southern Rocky Mountain States (6)	412,923
Pacific Coast and Northwest States (5)	7,773,180
	25,369,223
Alaska	12,000
Total	25,381,223

TABLE 1.—1955 U. S. PRODUCTION OF CHRISTMAS TREES

Species	Number	Percent
Douglas-fir	7,162,342	28
Balsam fir	6,006,224	24
Eastern redcedar	3,085,754	12
Black spruce	2,896,000	11
Scotch pine	1,560,085	6
White spruce	858,047	3
Red pine	802,657	3
Norway spruce	448,302	2
White fir	441,251	2
Red spruce	290,706	1
White pines (eastern and western)	286,267	1
Virginia pine	266,773	1
Southern pines	230,945	1
Lodgepole pine	212,100	1
Norway pine	187,500	1
Pinyon pine	162,750	1
Red fir (Shasta and California)	85,826	
Jack pine	77,700	
Blue spruce	43,531	
Engelmann spruce	17,389	
Alpine fir	12,048	2
Noble fir	11,652	
Junipers	9,790	
Miscellaneous pines	8,916	
Other	204,668	
Total	25,369,223	100

TABLE 3.—NUMBER OF TREES HARVESTED FROM NATIONAL FORESTS SINCE 1951.

Fiscal year	Number
1952	797,429
1953	886,596
1954	1,030,188
1955	959,651

TABLE 4.—UNITED STATES IMPORTS OF CHRISTMAS TREES.

		Total Imports (All from Canada)
Year	Number	Value
1952	11,555,748	$4,761,860
1953	11,035,785	4,891,556
1954	10,928,251	4,727,609
1955	12,409,578	5.658,993

Means of transportation.—About one-fourth the Christmas trees go by rail and three-fourths by highway, with a very small quantity moved over water, and fewer by air. Montana reported 88 percent of the trees harvested in 1955 were transported by rail, and 12 percent by truck.

A many million dollar industry.—Supply and demand, species, and the degree to which individual trees possess the desired characteristics determine prices. According to prices reported in various sections of the country, the trees produced in 1955 would amount to a 25½ million dollar wholesale business or a 47½ million dollar retail business. The value of the trees at the roadside or the railroad siding has been estimated at 12¾ million dollars.

"Christmas Trees, Indentification, Safety, Conservation" designated K-4 in an 8-page leaflet containing excerpts from AIB 94 and is available on request from the U. S. Department of Agriculture, Washington, D. C.

A. M. SOWDER
Extension Forester,
U. S. Department of Agriculture

Plotless Timber Cruising Tested in Upland Hardwoods

Using methods described by Grosenbaugh,[1] preliminary trials of the "plotless" or variable-plot method for estimating timber were conducted last year in uneven-aged upland hardwoods. The results indicated that the plotless cruise is subject to certain important limitations and that prior training and experience with the angle-gauge instrument are advisable before extensive use.

Field Work

The tests were made in two forest areas on the Kaskaskia Experimental Forest in southern Illinois. Area I, about 8 acres in size, had been under management for several years. Area II was a 23-acre compartment, as yet unmanaged, which was subdivided by natural features into five units of various sizes. The basal area and volume were obtained for each of these areas, including the five smaller units, first by the plotless method and later by actually measuring all trees. Area I and two units of Area II were cruised twice with the angle-gauge instrument to judge the consistency of results obtained by this system.

The simply constructed instrument used in these trials consisted of a 33-inch wooden stick with metal peepsight and crossarm. Its "critical angle" was 104.14 minutes. Sample points for the plotless cruise were spaced at 2-chain intervals along parallel compass lines 2 chains apart, giving an average of 2.5 points per acre. Trees were recorded by three size classes: small poles, large poles, and saw timber. The saw timber sized trees were further classified as merchantable or cull. If considered merchantable, they were recorded by estimated merchantable height to the nearest half log.

In the later 100-percent cruises, diameter at breast height of all trees of pole size and larger was measured with a tape. For saw timber sized trees, classifications of merchantability and estimates of merchantable height were made as previously, by the same individual.

Results

According to the 100-percent inventory, the plotless cruise consistently over-estimated the basal area of small poles, averaging 50 percent too high, and under-estimated that of large poles and saw timber sized trees by an average of 20 percent (Table 1). Estimates of saw timber volume averaged only about 8 percent low for both Area I and Area II, but results on the individual units of Area II varied more widely.[2]

Discussion

Very likely some of the error in basal area and volume estimates was caused by lack of experience with the angle-gauge. However, it was frequently difficult to determine whether or not certain trees should be counted. About 1 out of

[1] Grosenbaugh, L. R. Plotless timber estimates—new, fast, easy. Jour. Forestry 50:32-37. 1952.

[2] Ratios for converting basal area estimates to tree volume were derived for each half-log length, using a local form-class volume table considered average for the forest type involved.

TABLE 1.—ESTIMATE OF BASAL AREA AND SAW TIMBER VOLUME (INTERNATIONAL ¼" RULE) OF UPLAND HARDWOODS BY THE PLOTLESS CRUISE METHOD COMPARED WITH RESULTS FROM 100-PERCENT CRUISES

Area	Cruise	Basal area per acre: Small poles 5"-7"	Large poles 8"-10"	Saw timber 11"+ Merch.	Saw timber 11"+ Cull	Total	Volume per acre
		Sq. ft.					*Bd. ft.*
I	Plotless (1st)	5.2	13.0	37.8	0	56.0	3,970
(8.1 acres)	Plotless (2nd)	14.0	6.0	35.3	0	55.3	3,970
	100% cruise	7.2	11.0	46.7	0	64.9	4,325
II-A	Plotless (1st)	5.6	6.7	30.0	16.7	59.0	3,580
(3.7 acres)	Plotless (2nd)	8.9	6.7	41.1	8.9	65.6	4,440
	100% cruise	5.9	9.0	42.4	13.7	71.0	4,189
II-B	Plotless (1st)	15.7	8.6	48.6	12.8	85.7	6,470
(3.4 acres)	Plotless (2nd)	22.8	10.0	44.3	18.6	95.7	6,000
	100% cruise	12.7	10.9	49.4	13.6	86.6	5,868
II-C	Plotless	13.7	6.6	33.7	8.9	62.9	4,210
(10.5 acres)	100% cruise	9.0	9.6	45.1	9.6	73.3	5,200
II-D	Plotless	13.8	3.8	33.7	18.7	70.0	4,875
(3.3 acres)	100% cruise	6.6	10.4	38.4	20.3	75.6	4,585
II-E	Plotless	18.0	4.0	40.0	18.0	80.0	4,940
(2.0 acres)	100% cruise	9.4	12.2	42.7	18.3	82.6	4,470
II Total	Plotless	13.8	6.3	36.3	12.5	68.9	4,595
(22.9 acres)	100% cruise	8.7	10.0	44.1	13.2	76.1	4,960

every 14 trees was considered marginal. Generally, the questionable trees were the larger ones located 50 feet or more from the sample point. Visual perception was reduced both by distance and by obstructions of brush and small trees. Use of a wider critical angle as recommended by Husch[3] would tend to correct the underestimate of the larger trees, but it should be pointed out that plotless cruising in hardwoods with a moderately heavy understory would be impractical during periods of full leaf.

A second difficulty was encountered in estimating merchantable volume by the angle-gauge method. It was often impossible to judge whether a tree was cull or merchantable by simply viewing it from the sample point. Similarly, estimates of merchantable height were occasionally faulty because of unseen defects. The accuracy and dependability of volume estimates from plotless cruises could be much improved if the counted trees were inspected more closely. Probably this could be done most efficiently by a 2-man crew, one man using the angle-gauge and recording the data and the other checking on size class, cull, and limiting defects by visiting doubtful individuals.

Refinements in plotless cruise techniques will unquestionably give better results than those reported above. However, these tests show the need for the timber cruiser to test his proficiency with the angle-gauge instrument on an area of known stocking and to determine whether the method is suitable for his purposes before using it extensively.

GLENN H. DEITSCHMAN
Forester (Silviculture)
Ames Forest Research Center
(formerly with the Carbondale Forest Research Center)
Central States Forest Experiment Station, Forest Service,
U. S. Dept. of Agriculture

[3]Husch, Bertram. Results of an investigation of the variable plot method of cruising. Jour. Forestry 53:570-574. 1955.

The Chipola Chimney: A Cone Kiln for Research Use

An inexpensive and safe method of opening small quantities of pine cones, such as separate collections from individual trees, is often needed in forest genetics work and regeneration studies. At the Chipola Experimental Forest[1] in west Florida, the cone kiln shown in Figure 1 has met these needs.

[1]The Chipola Experimental Forest is maintained at Marianna, Florida, by the East Gulfcoast Research Center, Southern Forest Experiment Station, in cooperation with the Florida Board of Forestry.

The base, cover frame, and all sections are of 1-inch lumber. Sections 36 inches by 48 inches work well; they must be at least 8 inches deep if longleaf cones are to be opened. Sixteen-mesh wire screen makes good section bottoms, but ½-inch hardware cloth can be substituted in some sections if it is desired to have the seed drop into a lower section. The cover, as well as the hardware cloth in the opening of the base, may be omitted if mice are not a problem.

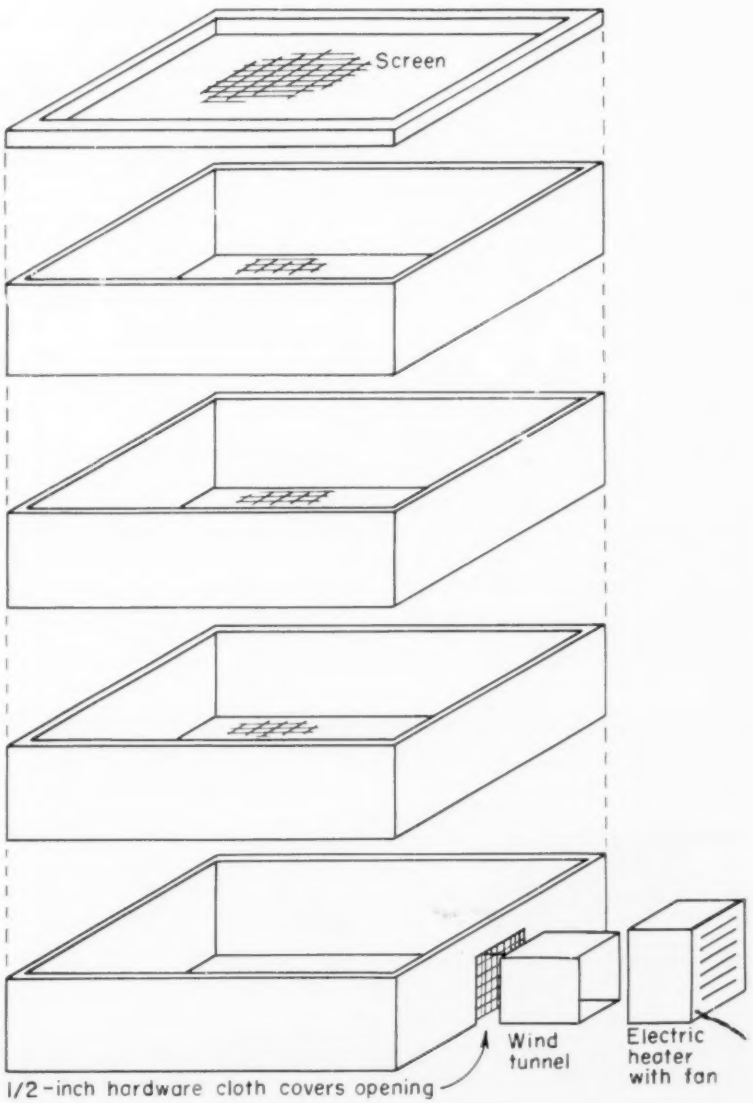


FIG. 1.—The Chipola chimney.

A single-element, 1,600-watt portable bathroom heater with a fan was found sufficient for a 36- by 48-inch kiln with 9 sections. The wind tunnel decreases the fire hazard. It may be of wood or metal; a rectangular 5-gallon can with both ends removed will serve the purpose. Kiln temperature is easily controlled by varying the distance between the heater and the tunnel. Very small models of the Chipola Chimney could be heated by light bulbs in the base.

It is good practice to fill each section to only ¼ of its depth. This speeds up drying and gives the cones room to expand. The sections should be interchanged every 24 hours so that all cones will dry evenly.

BROWARD DAVIS
Southern Forest Experiment Station, Forest Service, U. S. Department of Agriculture

Grubs in the Trunks of Live Green Ash Trees[1]

In hardwoods, mining of the trunks of live trees by grubs (insect larvae) results in great economic loss. Hardwood lumber, to command a high price, must yield a good percentage of pieces which are virtually free of blemishes. Grub damage is doubly serious with ash. Whereas with many hardwoods appearance of lumber is the prime consideration, in ash, strength is of equal importance. Grub holes cannot be tolerated in baseball bats, tennis racquets, pick handles, and the like.

Ash is one of the more important hardwoods in that it is a good seed producer, it is rather aggressive in seeding in openings, the trees are fairly successful at holding their own in competition with other hardwoods, and, a prime consideration, ash is eagerly sought at a good price. In Mississippi it seems probable that green ash is and will continue to be of far greater economic importance than white ash. Green ash seems to show a preference for non-agricultural bottomland soils, whereas, on the other hand, white ash will thrive only on the best bottomland soils and on moist, deep, fertile upland soils.

An exploratory study of grub damage to green ash in the vicinity of State College, Mississippi has yielded information most of which has not been previously reported in the literature.

Measurement of 17 larval mines shows that few are less than five or more than six inches long. The minimum and maximum lengths for mines which had entrance and emergence holes (three had no emergence holes) was four inches and six and a half inches. (It is not uncommon to find mines with no emergence holes where, presumably, predators have consumed the larvae.) These data confirm the impression on mine length gained from examining many times this number of mines.

Positive identification of entrance and emergence can be made by dissecting the trees. A blackish calloused area, resulting from the small, newly hatched larvae feeding in the cambium before entering the wood, surrounds the entrance hole. No such calloused area surrounds the emergence hole (Fig. 1). The diameter of the mine at the point of entrance into the wood is something less than the usual two- to three-tenth inch which is found throughout the rest of the mine's course.

Emergence holes are always above entrance holes.

A dark brown stain is associated with the larval mines. This stain may extend several inches below the point of entrance and above the point of emergence. A less conspicuous stain, often pinkish in color, seems to be confined to about one ring at the point of entrance and emergence. It extends vertically much farther than does the dark brown stain. This latter stain probably cannot, from its appearance, be identified from that caused by bird peck.

Only one larva and one pupa have been found in mines. These were indentified as carpenter worms (*Prionoxystus* spp.). Insects other than carpenter worms may be responsible for some of the damage. The finger of suspicion might be pointed to the pecan carpenter worm (*Cossula magnifica*) or to members of the genera Goes and Hammoderus. A few of the mines seem to have been made by larvae smaller than carpenter worms.

Few cases have been found where attack has taken place in the last five years. Considering the low precipitation in the vicin-

[1]Published with the approval of the Director, Mississippi Agricultural Experiment Station as Journal Article No. 593.

FIG. 1.—Section showing larval mine with calloused over entrance hole on left and emergence hole on right.

ity of State College in recent years, it is worth considering whether incidence of attack is associated with rainfall.

From careful ring counts, it seems that the insects are not in the trees for more than approximately one year.

There is evidence that insect attack increases with increasing diameter, at least up to a point. Eighteen green ash saplings, with a mean butt diameter of about two inches, had 0.28 larval mines per six foot butt section or, to express it on a basis comparable to the data which follows, 0.56 mines per twelve foot section. Eleven trees with a mean butt diameter of 4.8 inches had 1.27 mines per twelve foot section while eleven with a mean butt diameter of 7.3 inches had 3.45 larval mines. These trees were cut from a limited area which seemed to be a uniform site. The increasing infestation with increasing size may be explained by the fact that with increasing size the bark on the trees has crevices where eggs may be laid; the small trees are smooth-barked and have few crevices suitable for egg laying sites.

Carpenter ants were not found in any of the trees dissected. Much smaller ants, members of the genera Crematogaster and Camponotus, which use but do not enlarge mines are fairly common. These same ants will excavate the pith.

A forest manager would like to know why green ash in one stand is riddled with larval mines while the trees in another are virtually free of mines. Some differences in site condition or stand condition might be suspected. To attack the problem, a measure of the degree of infestation is needed. Counting external signs on trees will not provide a reliable measure of infestation for the following reasons: (1) It is impossible to separate, in all cases, the callous formed as a result of a grub entering the trunk (or an adult emerging) from that formed over a small pin knot. (2) In some cases an entrance hole is not accompanied by an exit hole. (3) In yet other cases, external evidence is so slight that it can be found only when dissection leads one to the exact point on the bark. (4) When the holes are sufficiently deeply buried in the wood, the bark resumes its normal pattern.

Dissection of 22 trees in an essentially uniform stand on an apparently uniform site revealed such variation in number of larval mines per tree that, for a statistically reliable estimate of infestation, an impossible number of trees would need to be dissected to sample the many stand and site differences which may be relevant.

Although knowledge on grubs in the trunks of green ash trees has been increased, the vital question of the factors contributing to infestation remains unanswered.

EDWARD G. ROBERTS
Forestry Department, Mississippi State College, State College, Mississippi

Section Box Score 1956 Membership

Section	Applications received[1] Dec. 1956	Total 1955	Total 1956
Allegheny	16	63	58
Appalachian	25	38	58
Central Rocky Mt.	5	12	32
Central States	23	44	42
Columbia River	19	100	77
Gulf States	18	107	79
Inland Empire	3	10	32
Intermountain	21	18	35
Kentucky-Tennessee	3	9	12
New England	7	50	61
New York	4	33	45
Northern California	20	33	67
Northern Rocky Mt.	2	44	31
Ozark	0	47	19
Puget Sound	7	65	44
Southeastern	20	85	92
Southern California	1	3	2
Southwestern	0	12	2
Upper-Mississippi Val.	20	51	72
Washington	0	2	1
Wisconsin-Michigan	32	40	102
Totals	246	866	963

[1]Students, Junior, Affiliate, Associate (Initial) grades only.

School Box Score 1956 Membership

School	Student applications received Dec. 1956	Total 1955	Total 1956
Alabama Poly. Inst.	0	18	6
Univ. of California	19	17	53
Colorado A & M Col.	4	9	28
Duke Univ.	2	3	7
Univ. of Florida	19	17	25
Univ. of Georgia	0	28	30
Univ. of Idaho	3	4	21
Iowa State College	17	22	31
Louisiana Poly. Inst.	7	13	27
Louisiana State Univ.	9	43	22
University of Maine	0	12	13
Univ. of Massachusetts	7	11	20
Michigan State Univ.	24	14	50
Univ. of Michigan	5	21	24
Univ. of Minnesota	0	19	26
Univ. of Missouri	0	26	2
Montana State Unv.	0	25	17
State Univ. of N. Y.	1	23	38
N. C. State College	21	22	24
Oregon State College	13	38	44
Pa. State Univ.	16	32	35
Purdue Univ.	20	24	36
Utah State Agric. Col.	21	12	28
Univ. of Washington	7	28	21
W. Va. Univ.	0	26	5
Yale University	0	16	13
Totals	215	523	646

We Present

Clarence S. Herr
Industrial Forester

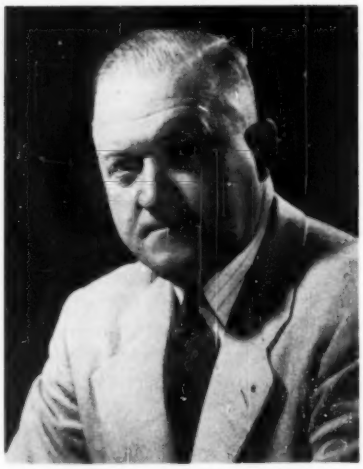
As all the world knows (or should) the "Pennsylvania Dutch" country is noted for excellent farms, which early earned it the name of the Garden Spot of America. (With characteristic presumptuousness Southern California later unsuccessfuly tried to pre-empt the title.) This region of ten southeastern Pennsylvania counties is notable for another reason; it has probably produced as many professional foresters as any comparable area in the nation.

You will find them scattered far and wide throughout every timbered region of the United States, as well as in several foreign countries. Parenthetically, one of them, a Berks County man, after years of residence in a Latin American land, spoke Spanish with a Pennsylvania Dutch accent, an odd and improbable form of expression, fascinating to hear. Although expatriates, most of them cling to the customs and locutions of their native heath. Few would change if they could.

A case in point is that of Clarence S. Herr, born and raised in Lancaster County, but a practicing forester in New Hampshire for these thirty years past. It takes at least two generations to acquire the authentic northern New England accent; Herr's is still that of the lower Susquehanna Valley.

Born in Maytown, Pa., on September 26, 1901, Herr became interested in forestry through his work in scouting. During the summer of 1920, following graduation from high school, he got a job as a guard in the White Mountain National Forest. Working on trail construction, as a compassman, and as fire lookout, he stayed there until entering the Pennsylvania State College (now University) in the fall of 1921. Graduating four years later with the B. S. degree in forestry, he spent a year as a field assistant on the Allegheny National Forest, then was appointed as a white pine blister rust agent in the New Hampshire Forestry Department. That was in 1926. Ever since he has been a forester and resident of the old Granite State.

After two years as blister rust agent he was named by the University of New Hampshire as extension forester for the northern portion of the state. His



CLARENCE S. HERR

work with farm woodland owners and wood using industries in the area resulted in several technical bulletins and popular articles. Meanwhile he took time out to get a master of science degree in forestry at Harvard University in 1930.

Then after twelve fruitful years with the Extension Service, Herr was offered appointment in 1943 as chief forester for the Brown Company at Berlin, N. H. Formed in 1852, this company for nearly a century has been converting the yields of New England forests into lumber, pulp, paper, chemicals, and other cellulose products.

Whether apocryphal or not, the story is told that there would be no Brown Company if the battle had not occurred between the *Monitor* and the *Merrimac*. This episode, though indecisive as affecting the outcome of the Civil War, had a profound effect on William Wentworth Brown, a producer of ships' knees at Portland, Maine. A naval engagement between ironclad ships had discouraging implications for the future construction of wooden vessels of war, and Mr. Brown at the age of 47 began looking for a new business.

In 1852 a sawmill had been built on the Androscoggin River at Berlin (pronounced with the accent on the first syllable). Mr. Brown bought a controlling interest in the mill.

Meanwhile, processes were being perfected for the manufacture of paper from wood pulp. Heretofore made almost entirely from rags with some admixture of straw and soda pulps, paper was undergoing revolutionary changes in manufacture with the development of the sulphite process.

With an abundant nearby wood supply, plentiful water power, rail transportation, and an adequate labor force, Mr. Brown began to make paper in 1892. Over the years the company branched out into many kinds of wood cellulose products. Through its own research and the application of research findings by the industry as a whole the company now produces a multitude of items useful alike to domestic and commercial users.

A special mill produces wood pulp for sale to the paper industry as well as for the manufacture of cellophane and nonpaper products. A kraft pulp mill turns out unbleached pulp from both hardwoods and softwoods. This pulp goes into a host of articles—everything from coffee bags to sandpaper to paper towels. A special process combines cellulose fibres with pitch to make a bituminized pipe used in sewers and conduits. Still another product has many of the qualities of leather and goes into the manufacture of shoes, handbags, and similar items. Finally, the plant manufactures a line of chemicals used not only in the company's products but sold to municipalities for water purification and to the paper and textile industries for bleaching. In short, Brown Company is a research-minded firm with a versatile line of products. In 1955 sales totaled $53.8 million.

Advanced from chief forester to assistant resident woods manager in 1945, Herr was named woods manager in 1948. When promoted to vice president in charge of woods operations in 1952, he was made custodian of an extensive and valuable timber resource.

The company has sole ownership of some 500,000 acres in Maine, Vermont, and New Hampshire. In addition, 300,000 acres are jointly owned; on this land the company is the chief wood harvester. The growth on these 800,000 acres provides one-half the company's annual requirements. The balance is obtained from an area of some 3.6 million timbered acres available within a fifty-mile radius of Berlin.

Of the 4,500 Brown Company employees, the Woods Department during peak operations employs about 1,000. The supervisory woods staff consists of approximately 100 foremen, clerks, and scalers. The cutting operations are conducted from 16 camps each with 60 to 80 men. There are 18 professional foresters.

From company lands the annual harvest amounts to 80,000 cords of spruce and fir pulpwood; 85,000 cords of hardwood pulpwood; 7,000 cords of white pine logs; 11,000 cords of spruce logs; and 18,000 cords of yellow birch logs.

Both partial and clearcutting is practiced; the latter, confined to overmature stands. The silvicultural system in use on any particular tract is determined by the quality, age, and kind of species. As early as 1943 the company began taking aerial photographs of its own holdings, as well as the adjoining areas from which it buys wood. These photographs are now indispensable tools of management.

All company woods operations are becoming highly mechanized, requiring special training and recruitment of bulldozer, crane, and shovel operators, boat operators, river drivers, and cooks. During the hauling season a fleet of 450 trucks must be assembled to transport the wood to the mills, rivers, streams, and lakes.

In addition to the company's raw material requirements from its own holdings, from 40 to 60 percent is procured from privately owned lands. This amounts to 150,000 to 250,000 cords annually. From five to ten forester-buyers are responsible for the procurement of this tremendous volume. But, in addition, these men provide individual advice on silvicultural problems for the hundreds of stands harvested yearly.

Within recent years the company has experimented with the utilization of sawmill waste for pulp production. Approximately 40,000 cords of wood chips from waste wood are now consumed annually by the pulp plants, and it is expected that this volume will soon be substantially increased.

Recently, Herr was elected vice president and director of Granite State Veneer, Inc. of North Stratford, N. H., one of Brown's newly acquired subsidiaries. As the administrator of all these company operations, as well as of others which there is insufficient space to describe, he is one of the busiest foresters in the Northeast. But more than this, he is active in many other enterprises connected with his industry and his profession.

A member of the Society of American Foresters since 1926, he was successively secretary of the New England Section for three years, then vice chairman, and chairman. Elected to the Council of the Society in 1946 he served two two-year terms, and was vice president during 1950-1951.

President of the New Hampshire Timberland Owners Association since 1944, he is also on the board of directors of the American Pulpwood Association, is a member of the Committee on Imports for the American pulpwood industry, and is on the Forestry and Wood Industries Committee of the New England Council.

During the second world war he served with the pulpwood units of both the Office of Price Administration and the War Production Board in Washington, D. C. To the customary frustrations experienced by a man of decision trying to buck the inertia of bureaucratic officialism were added, in his case, two of the hottest and most humid summers in Washington's moist and torrid history. Nowadays, he seldom speaks of his war service, although it was competent as well as productive; when he does it is never with the nostalgic affection of a citizen who performed a patriotic duty in a strange and quaint milieu. Unconsciously, he thinks of the region south of the Mason and Dixon's Line as *terra incognita;* of the nation's capital, as a place to fly over in transit or a depot from which to catch the next train away — preferably north.

What manner of man is this Pennsylvanian turned New England Yankee? Herr has a native ability, essential among administrators, for supervising people and affairs. Fundamentally thoughtful and serious — the kind of person who thinks twice before he acts — Herr is neither stuffy nor lacking in humor. Through his wide acquaintance in the forestry profession and his contacts with men of the paper world, he is well informed beyond the average, and his opinion is frequently sought by those in high places — officials of government as well as captains of industry. Although a persuasive talker when the occasion requires, he is by preference a listener.

To a stranger Herr may appear curt in speech. But he is the last man to give deliberate offense. His bluntness is often politeness in reverse. He pays you the compliment of giving you the straight facts without assuming that you need preparatory buttering-up.

His listing in *Who's Who in America* is characteristic. Another man with a career as full as his has been might justifiably have included all significant events, offices, and titles in his biography. Herr's is limited to a modest 14 lines.

The company's woodlands, especially in western Maine, contain some of the finest brook trout and landlocked salmon water in the United States. Parmachenee Lake, the Magalloway River, and the Kennebago drainage are names almost as holy to the fly caster as is Mecca to a Mohammedan. In his official travels Herr is in constant proximity to streams that a dedicated fly fisherman would give his immortal soul to be on when conditions are right.

But he is an ardent golfer. He cares nothing about fishing, and never wets a line. One might suppose that any man constantly exposed to unsurpassed trout and salmon water would weaken in time, but not Herr. Golf is his game and to golf he sticks.

Twenty-five years ago when Herr, then a young extension forester, was persuading hard-headed Yankee farmers to manage their woodlots on a sustained-yield basis, one of his superiors made a comment about his work that was to be prophetic of his entire career. "Mr. Herr," he wrote, "has the ability of getting people to do things that need to be done." This is one of the most valuable attributes a forester can possess. Would that more of us had it.

HENRY CLEPPER

Raphael Zon (1874-1956)

Raphael Zon, for many years one of the best known figures in American forestry, died in St. Paul, Minn., on October 28. He was in his 82nd year.

Born December 1, 1874, in Simbirsk, Russia, he came to America as an immigrant in 1898 and became a United States citizen in 1903. He had previously received bachelor of arts and bachelor of science degrees in his native country. A degree in forestry was conferred on him in 1901 by Cornell University.

In that year Mr. Zon entered the U. S. Forest Service as a student assistant and was assigned to forest investigations. Six years later he was made chief of the Office of Silvics, and in 1920 was put in charge of special investigations in forest economics.

In 1923 he organized and became director of the Lake States Forest Experiment Station at St. Paul, Minn. This was the position he filled with distinction and to the notable advancement of forestry research until his retirement in 1944.

Mr. Zon's published contributions to forestry literature total two hundred titles. Much of his writing reflects not alone broad scientific knowledge, but a keen philosophical concept of the importance of forestry to human welfare. Had he never written another thing, his name will long be remembered for the book, *The Forest Resources of the World*, compiled in collaboration with William N. Sparhawk, and published in 1923. It was the first attempt to make a systematic and accurate inventory of the earth's forests.

RAPHAEL ZON

A pioneer in the study of the relation of forests, streamflow, and flood control, Mr. Zon set forth his findings in 1927 in a bulletin, *Forests and Water in the Light of Scientific Investigation*. At first violently attacked, his theories are now widely accepted. Another project which finally received widespread approval was the Great Plains shelterbelt planting program started in 1934. An enthusiast about shelterbelts, he helped plan the project and was in charge of the technical phases of its development.

Throughout his official career Raphael Zon exercised a national influence on the development of forest research not surpassed by any other American forester. But it is not alone Mr. Zon's achievements as a government forester, important and valuable as they have been, that merit recognition.

With the late Bernhard E. Fernow, he helped establish our periodical forestry literature. He served on the editorial board of *Forestry Quarterly* from 1905 until it was merged with the *Proceedings of the Society of American Foresters* in 1916 to become the JOURNAL OF FORESTRY. At the same time he was editor of the *Proceedings* during most of its existence from 1905 to 1916. When the JOURNAL OF FORESTRY was launched in 1917 he was its managing editor, and served in that capacity until 1923 when he succeeded Dr. Fernow as editor-in-chief, which position he then held for five years.

To Raphael Zon, a great editor as well as a great writer, was largely due the stimulating leadership that the JOURNAL OF FORESTRY has exercised in the advancement of the profession in America. Over a period of twenty-five years, his editorial work was characterized by high ideals, tolerant understanding, unfailing good judgment, and a belief that truth will emerge from the clash of divergent opinions.

Mr. Zon became a member of the Society of American Foresters in 1904 and was elected a Fellow in 1918.

At the 52nd annual meeting of the Society, held in Montreal, Canada, in November 1952, he was awarded the Gifford Pinchot medal for outstanding service to the profession of forestry. In making the presentation, President George L. Drake said, "You have truly earned it, and may it long serve as a reminder of the respect and affection in the hearts of your many friends and colleagues."

Reviews

Tomorrow's Birthright: A Political and Economic Interpretation of our Natural Resources.

By Barrow Lyons. 424 pp. Funk & Wagnalls, New York City. 1956. $5.

Barrow Lyons, like many other serious students of natural resource problems, believes that sound resource management is more a political and economic problem than a technical one. We now have ample technical knowledge to do a good resource management job; what we need is an understanding of the political and economic aspects of the problem and action based on such understanding.

The question is raised whether we Americans, as a people, are now beginning to live beyond our natural resources incomes. The prospect that our population will double within a century and that national income will become perhaps 16 times as great as at present implies a staggering increase in our demand for basic resources. Where will these resources come from?

Part of the answer lies in conserving what we have left, part in developing inexpensive methods of processing lower-grade materials, part in finding substitutes, and part in more extensive world trade. Science can be counted on to provide the technical means by which our economy can continue to expand for a long time to come, but can it do so without realistic appraisal of long-term needs and organized planning to meet them?

Barrow Lyons answers the latter question negatively. In his interesting account of the nation's physical wealth—soils, forests, water, oil, metals and minerals, water power, and atomic energy—he implies that our future demands for natural resources can be adequately met, but only if planning and social action in regard to these resources become a dominant national policy.

The author tells two parallel stories of our use of basic natural resources. One story traces the growth of demand, technological development in the use of resources, and the impact of use on these resources. The other story recounts the failures of economic self-interest and political action to safeguard our natural resources.

Mr. Lyons is willing to pat American industry on the back for its great achievements in converting basic resources into useful products. However, he believes there is an inherent limitation in the ability of private enterprise to engage in long-range planning in the public interest. Private interest conflicts with public interest in such instances as the "mining" to exhaustion of agricultural soil, the pollution of streams by industry, and the denudation of forests.

In examining these conflicts of interest, the author sees a great need for public planning and action. The action he visualizes may be more direct than foresters usually advocate in regard to forest resources. Foresters commonly place much reliance on education, example, persuasion, and financial inducements by government to accomplish conservation ends, but these approaches may not serve as well in such areas as water, water power, and atomic energy which attract the author's main attention.

The author does not shy away from "socialism." He feels that this word has been frequently used to scare people from permitting government to do those things which it can and ought to do in the public interest. Nevertheless, he does not believe that the cry of socialism will deter the long-term trend toward the assumption by public agencies of more and more responsibility for the management of natural resources, nor does he believe this trend will be feared by the majority of people just because it is socialistic.

Mr. Lyons' plea for public planning and action in the field of natural-resource conservation is bound to provoke opposition from those whose political philosophy opposes public restraints upon individual enterprise, but regardless of our political reactions to his thesis, the story he has to tell of the use and abuse of basic resources is informative, highly interesting, and stimulating.

LEE M. JAMES
Michigan State University

Nature's Guardians

By Harry Edward Neal. 192 pp. Illus. Julian Messner, Inc., New York 18, N. Y. 1956. $3.50.

Subtitled "Your Career in Conservation," this readable book portrays the dynamic challenge of conservation in a manner that should appeal to young men of high school and early college age. It is more than a vocational guide; it comes nearer being a star equipped for wagon hitching. The author presents an amazing amount of information with a minimum of words, yet his brevity never detracts from a style that somehow conveys the adventurous and romantic aspect of a career in conservation without glamourizing it.

Although the book emphasizes careers in wildlife conservation and management, it also covers forestry, fisheries, soil conservation, and allied employment possibilities in informational and administrative fields. References are made to job opportunities at federal, state, industrial, and educational levels. Specialists might wish to see more attention given to some phases of forestry and particularly to national park opportunities, which are omitted, but it is difficult to see how anyone could

have packed more information into the necessarily limited confines of one small book.

Beneath a simplicity of style, and a factual approach, this book is actually a studied dramatization of conservation careers and goals. Glimpses of the exploits of conservation pioneers, from Pinchot to Pulaski, are cleverly worked into the text, as are also thumbnail biographies of men now on the job of shaping their boyhood dreams to the hard actualities of fighting forest fires or arresting market hunters.

The keynote of *Nature's Guardians* is struck in a foreword by Dr. Ira N. Gabrielson. A short introductory chapter on the beginnings of the conservation movement, stressing forestry, is followed by 11 chapters covering as many specific careers in conservation. Nor are associated careers forgotten. Clerks, engineers, photographers, statisticians, chemists, economists —all these and other supporting jobs are tied in to the conservation picture as essential activities.

Concluding chapters deal with education and specific employment possibilities. Here, again, the usefulness of the book could have been increased by giving more attention to fields other than wildlife. Nothing is lacking, however, in the fully representative bibliography and list of sources of further information, at the back of the book.

Typography and format are good, chapter headings compact, and the index adequate. Illustrations are well chosen to convey the idea of exploring new frontiers in science. They pack considerable punch, and point up the fresh outlook of the entire book, nearly every page of which says, "This is it, men; let's get going!"

CLIFFORD C. PRESNALL
U. S. Fish and Wildlife Service

California and the Southwest

By Clifford N. Zierer, editor. 376 pp. Illus. John Wiley & Sons, Inc., New York, N. Y. 1956. $11.25.

The physical, biological, and historical characteristics of the four southwestern states, Arizona, California, Nevada, and Utah, are described, sometimes in considerable detail, in the first part of the book.

Chapters follow which discuss the natural resources of this region including the many industries involved in the use and development of these resources. The manufacturing industries — not neglecting motion pictures, radio, and television—are well covered. The problems of transportation, power, water supply, etc., of the cities are also discussed. And, for the sophisticated, there is a good account of "Nevada Cities of Gambling and Divorce."

The editor states in the preface, "Each chapter may be read as a separate essay on a particular topic." This is indeed true and inasmuch as each chapter is by a different author the style of the composition varies from a rather dry, well-written, technical report to a very interesting and informative essay.

Many maps and charts cover the subject matter in the various chapters. The book, however, lacks a composite map showing the principal rivers, mountain ranges, mountain passes, etc. For example, reference is made to the San Gabriel and Tehachapi Mountains and the Cajon Pass of California, the Catalina Mountains of Arizona, the Kaibab and Uinkaret Plateaus of Utah, but there is no map showing these geographical features.

Since the major contributing factor to the serious smog situation in the Los Angeles area is temperature inversion, one would expect a description of this climatic condition in the chapter "Weather and Climate," but the smog problem is not mentioned until 300 pages later in the chapter entitled "Urban Development and Major Centers."

The reviewer will have to take issue with a statement on page 67: "The value of chaparral for watershed protection is questionable." This statement should be qualified. Most foresters would concur with the statement on page 130: "The various chaparral species in Southern California have value largely for watershed protection." The disastrous floods of the past which followed the removal of the chaparral is a clear index to the value of this type of cover.

California and the Southwest is an excellent, up-to-date, concise source of information on the history, geology, natural resources, agriculture, industrial and community development of the Pacific Southwest. It deserves a wide national distribution, but the price of the book may inhibit this.

WILLIAM G. KOHNER
Pasadena City College

The White-Tailed Deer In Wisconsin

By Burton L. Dahlberg and Ralph G. Guettinger. 282 pp. Illus. Wisconsin Conservation Department, Madison 1, Wis. 1956. (No price indicated.)

This book is a report on the major findings of Wisconsin's Deer Project, a study of the white-tailed deer during the 14-year period 1940 to 1954, under the Pittman-Robertson Federal Aid in Wildlife Restoration Act. It is written in semi-technical style to attract the attention of the Wisconsin sportsman in the hope of obtaining the necessary understanding and support for an improved deer-management program.

The historical background leading up to Wisconsin's bitter deer controversy of the past twenty years is discussed. The forests of northern Wisconsin became the primary deer range of the state following logging and settlement. By the middle 1930's, conservation effort in game-law enforcement, protection from fire, and use of the buck law and refuges had resulted in an unbalanced condition between an expanding deer herd and the decreasing food supply of the reforesting cutover lands.

Detailed information is presented on the study of the deer herd. This includes life history,

movements, food habits, weights in relation to range conditions, and natality and mortality factors. A life equation for Wisconsin deer, based on herd increase and mortality data during ten years of buck hunting, effectively brings out the fact that the legal harvest of only 7.5 percent of the herd annually is a small part of the total mortality.

The deer range and its problems were studied. The herd, scattered widely over 16 million acres of forested summer range and farmlands, concentrates during severe winter weather on an estimated 2 million acres of deer yards. The annual period of yarding varied from 27 to 130 days, averaging 90 days. Reports were compiled on the condition of 800 of 819 known deer yards, with an average of 163 yards examined annually. By the winter of 1948-1949, 64 percent of the northern yards and 55 percent of the central yards were classified as being in poor condition.

The impact of this large deer herd was further illustrated by Conservation Department payments of 5,795 agricultural damage claims totaling $396,370, and the expenditure of $589,525 to distribute 7,467 tons of artificial feed during the period 1932 to 1954.

Evidence collected and presented by the Project was an important factor in obtaining liberalized hunting in the three seasons 1949 to 1951. Removal of three to four times the normal legal buck kill in these seasons reduced the herd in varying degrees over the range. Deer hunters and sportsmen considered this reduction too drastic and resisted further attempts at herd management. However, the recovery of the herd has been such that a growing number of hunters are now beginning to see the merit of managed deer harvests.

The ideal hunting season, according to the authors, would be an open season on forked-horn bucks, with additional permits issued for taking anterless deer on management areas according to local conditions.

Habitat management programs without control of excessive deer populations are a waste of hunters' money. Management techniques which can be incorporated in regular forest management programs, as well as special additional practices, are discussed. Forest management will be the principal tool for habitat improvement. If the forester and the game manager work in close cooperation, both the forest and the game will benefit.

The book is well illustrated with 71 photographs, 23 figures and maps, and 53 tables. An appendix of 40 pages contains detailed information on study techniques and results.

Foresters and wildlife managers will find much valuable information here. Some may be disappointed in the emphasis which has been given to justifying the need for herd management at the expense of developing more specific techniques and procedures to guide the recommended program.

Single copies of the book are available free.

HERMAN F. OLSON
U. S. Forest Service

Publications of Interest

Interest in the papers on forest plantations presented at the last Winter Meeting of the New York Section, Society of American Foresters, prompted the compilation of these papers in a booklet entitled *Forest Plantations—the Course Ahead.* This booklet is now available from the Secretary, Prof. John W. Barrett, State College of Forestry, Syracuse 10, New York, for 25c a copy.

Topics covered in the nine papers include planting policies for public and private lands; utilization of thinnings; watershed, wildlife and recreation potentialities; and plantations as an investment.

The booklet contains a most comprehensive treatment of the subject by authorities in their fields. The principles and experiences stated could have a decisive influence on forest plantation establishment and management not only in New York state, but elsewhere.

* * *

When conservation becomes the topic of discussion in the classroom or the civic association meeting, *Concepts of Conservation* will be a helpful guide.

The booklet, prepared for teachers, students, and interested organizations by the Conservation Foundation, presents a brief statement of today's problems of conservation. The booklet discusses four categories in which men must be concerned with renewing resources; fresh water supplies, agricultural lands, forests and grasslands, and animal life. Each category carries with its section a number of topics for group discussion, offering bibliographies for source material. Also included is a list of 16mm films with information about where each may be secured.

Copies of the pamphlet may be obtained by writing to "Conservit," P. O. Box 1812, Grand Central Station, New York. The price is 25¢. Bulk orders of 50 copies can be obtained for $10.

* * *

A report on probability of decay and its rate of spread after logging injury to four important Pacific Northwest tree species has been released by the U. S. Forest Service's Pacific Northwest Forest and Range Experiment Station.

Decay Following Logging Injury to Western Hemlock, Sitka Spruce, and True Firs, by Ernest Wright and Leo Isaac, shows how volume losses can be determined for trees injured during logging in a stand. True firs included in the study were grand fir and Pacific silver fir. Results of the study apply directly to groups of trees in western Oregon and western Washington, but should be useful in estimating decay following logging in stands of these species in other localities.

* * *

Why, how, and when to prune coniferous plantations is the subject of *Pruning Pine Plantations in Michigan* by Robert A. Ralston and Walter Lamien. The 27-page pamphlet is directed primarily to owners of small private forest plantations because they can use the suggested methods without direct cash outlay. Research was carried on in the lower peninsula of Michigan, but the authors feel the information will be applicable throughout the state and in adjoining states. Many illustrations, both pictoral and tabular, supplement the text. The pamphlet is Circular Bulletin 221 published jointly by Michigan State University Agricultural Experiment Station and U.S.D.A. Lake Forest Experiment Station.

Current Literature

Compiled by MARTHA MEELIG, *Librarian, State University of New York College of Forestry*

Range Management Section Compiled by Division of Bibliography, Library, U. S. Department of Agriculture

General

Forest History Sources of the United States. Comp. & ed. by C. M. Neiderheiser. Forest History Foundation, Inc., 2706 W. 7th Blvd., St. Paul 16, Minn. 1956. $3.00.

Forest Ranger. By J. J. Floherty. Career study, 142 pp. Illus. Lippincott, Philadelphia. 1956. $2.75.

Forests and French Sea Power, 1660-1789. By P. W. Bamford. 240 pp. Univ. of Toronto Pr., 1956. $5.00.

Liberty Hyde Bailey, an Informal Biography. By Philip Dorf. 271 pp. Cornell Univ. Pr., Ithaca, N. Y. 1956. $3.50.

Tree Physiology; Bibliography. Comp. by T. T. Kozlowski. 316 pp. Publ. by the author, Univ. of Massachusetts in coop. with U. S. Forest Service. Amherst, 1956. Mimeog.

Wald and Holz in U.S.A. By Hans Gläser. 192 pp. Illus. Kommentator, Frankfurt/Main. 1956.

Farm Forestry

Placing Our Northern Hardwood Woodlots Under Management. By R. J. Hutnik. 24 pp. Illus. Northeastern Forest Expt. Sta., Upper Darby, Penna. 1956. Sta. Paper No. 82. Mimeog.

Forest Economics

Distribution of Timber Cut by Species and County in New York State. By E. F. Von Ohlsen. 23 pp. Maps. State Univ. of New York College of Forestry, Syracuse 10. 1956.

Forest Influences

Outline for Compiling Precipitation, Runoff, and Ground Water Data from Small Watersheds. By E. A. Johnson and R. E. Dils. 40 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1956. Sta. Paper No. 68.

Forest Management

The Quality Index in Hardwood Sawtimber Management. By A. M. Herrick. 26 pp. Purdue Univ. Agric. Expt. Sta., Lafayette, Ind. 1956. Sta. Bul. No. 632.

Use of Long-Log Scaling Tables in Southeast Alaska. By H. E. Andersen and J. E. Weisgerber. 2 pp. Alaska Forest Research Center, Juneau. 1956. Tech. Notes No. 32. Mimeog.

Forest Resources

Forest Inventory Statistics for Blount County, Tennessee. 18 pp. TVA, Norris. 1956. Forestry Bul. No. 39. Mimeog.

——— *for Buncombe County, North Carolina.* Forestry Bul. No. 40.

——— *Sevier County, Tennessee.* Forestry Bul. No. 41.

Hardwood Timber Resources in Central and Northern Georgia. By R. W. Larson. 48 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1956. Sta. Paper No. 70. Mimeog.

Indiana's Forest Resources and Industries. By O. K. Hutchison. 44 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. For Resource Rept. No. 10. 35 cents (Govt. Print. Off.)

Ohio's Forests and Wood-Using Industries. By O. K. Hutchison and J. T. Morgan. 40 pp. Illus. Central States Forest Expt. Sta., Columbus, Ohio. 1956. For. Survey Release No. 19.

Timber Supplies for Industry in Arkansas. By H. S. Sternitzke. 32 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. For. Resources Rept. No. 11. 30 cents (Govt. Print. Off.)

Pathology

Elm Disease Sprays; Formulas & Ingredients. By R. R. Whitten. 2 pp. Central States Forest Expt. Sta., Columbus, Ohio. 1956. Sta. Note No. 92. Mimeog.

Tree Injuries. By H. L. Edlin and M. Nimmo. 125 photographs. Thames & Hudson, 244 High Holborn, London, W.C. 1. 1956. 21s.

Protection

Bark Beetles and Their Control in Georgia. By R. P. Harrison. 12 pp. Illus. Georgia Forest Research Council, Southern Forest Expt., Sta., Georgia Forestry Commission. 1956. Rept. No. 2.

Important Insect Enemies of Southern Pines. Comp. by W. H. Bennett. 21 pp. Southern Forest Expt. Sta., New Orleans. 1956. Southern Forest Pest Reporter No. 10.

An Insect Trap. By P. A. Godwin. 4 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. ARS-33-22.

Red Pine Scale. By J. L. Bean. 4 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1956. Forest Pest Leaflet No. 10. 5 cents. (Govt. Print. Off.)

Range Management

Vegetational composition and animal gains as affected by degree of forage utilization on shortgrass range land in southeastern Wyoming By R. L. Lang. 86 pp. Ph.D. Thesis, Univ. of Nebraska. 1955. (Available in microform from Univ. Microfilms, Ann Arbor, Mich. $1.08.)

Wildlife habitat research needs in southern forests. By H. D. Burke. 64 pp. Illus. Processed. U. S. Forest Service. Southern Forest and Range Expt. Sta., New Orleans. Occasional Paper 149. 1956.

Silviculture

California Cone Crop—1956. By G. H. Schubert. 2 pp. California Forest & Range Expt. Sta., Berkeley. 1956. For. Research Notes No. 110. Mimeog.

Experimental Air-layering of Shortleaf and Loblolly Pine. By Bratislav Zak. 12 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1956. Sta. Paper No. 69. Mimeog.

Guide to Bark. By A. Schwankl. Trans. by H. L. Edlin. Illus. Thames & Hudson, 244 High Holborn, London, W.C. 1. 1956. 12s 6d.

Influence of Soil and Topography on Willow Oak Sites. By W. R. Beaufait. 12 pp. Illus. Southern Forest Expt. Sta., New Orleans. 1956. Occasional Paper No. 148. Mimeog.

Wood Preservation

Improving the Fire Resistance of Foundry Bottom-Boards. By Milton Applefield. 14 pp. Illus. Texas Forest Serv., College Station. 1956. Research Note No. 16. Mimeog.

Wood Techonology and Utilization

Some Highlights of Pulpwood Production in the Lake States, 1946-1955. By A. G. Horn. 2 pp. Lake States Forest Expt. Sta., St. Paul 1, Minn. 1956. Tech. For. Notes No. 457. Mimeog.

Society Affairs

Officers and Council
1956-1957

DEWITT NELSON, *President*
Department of Natural Resources
315 State Office Building 1
Sacramento 14, Calif.

B. E. ALLEN
Union Bag—Camp Paper Corporation
P. O. Box 570
Savannah, Ga.

PHILIP A. BRIEGLEB
Southern Forest Experiment Station
704 Lowich Building
2026 St. Charles Avenue
New Orleans 13, La.

C. HUXLEY COULTER
Florida Forest Service
Tallahassee, Fla.

GEORGE A. GARRATT, *Vice President*
School of Forestry
Yale University
New Haven 11, Conn.

STANLEY G. FONTANNA
School of Natural Resources
University of Michigan
Ann Arbor, Mich.

MAURICE K. GODDARD
Department of Forests and Waters
Harrisburg, Pa.

EDWIN F. HEACOX
Weyerhaeuser Timber Company
Tacoma 1, Wash.

HENRY CLEPPER, *Executive Secretary*
Mills Building, 17th Street at Pennsylvania Avenue, N.W.
Washington 6, D. C.

JOSEPH S. ILLICK
College of Forestry
State University of New York
Syracuse 10, N. Y.

J. HERBERT STONE
U. S. Forest Service
729 N.E. Oregon St.
Portland 8, Ore.

HENRY J. VAUX
School of Forestry
University of California
Berkeley 4, Calif.

The President's Column

DEWITT NELSON

My thanks and sincere appreciation to the Kentucky-Tennessee Section for the wonderful meeting planned, organized, and executed at Memphis in October. Special commendation goes to General Chairman Russell Stadelman and his many committees and co-workers. Also my thanks to the subject matter Division chairmen and their participants for the excellence of their programs.

Unhappily, there was one discordent note sounded during the meeting which leads me to discuss the problem of ethics.

In 1948, the Society adopted a Code of Ethics which was formulated as the guiding principles of professional conduct for foresters in their relations with each other, with their employers, and with the public.

During the recent political campaign, naturally there were differences of opinion among members of the Society. There was organized a "Conservationists for Stevenson-Kefauver" committee, the chairman of which was a past president of the Society. Membership and participation in such a committee is certainly the individuals' privilege. However, certain subsequent actions were diametrically opposed to the Code of Ethics of our profession and the nonpolitical nature of our Society.

Briefly, the actions were as follows. There was a request for use of the Society's mailing list which was denied. There was then a request to run a paid political advertisement in the JOURNAL which was also denied. Then disregarding a verbal warning against its use and the printed notice on the front of the Directory of Members, the principals proceeded to use the Society's new Directory as a mailing list.

Upon my arrival at Memphis I received a telegram reporting "rumors" that "Assistant Chiefs, Regional Foresters, and Directors" were slated for "schedule C" (political appointments) and uring the Council to "reaffirm its opposition" to any such move. The Council considered the telegram, but because these were only rumors it obviously was unnecessary to reaffirm its existing policy.

On October 16, a Memphis newspaper carried a story captioned "Leading Forester asks GOP for Clarification" in which the party concerned used his 1947-1948 presidency of the Society to provide stature to his interview with the reporter in which he asked the "Republican Administration to clarify its position on the question of continued civil service status for the Government's top professional foresters," and stated that this request had been made to the President and Secretary of Agriculture by telegram. This story made it appear that the Society, meeting in Memphis, was playing partisan politics. On subsequent questioning and by securing a copy of the telegram which was also released to the press it was learned that the sender's affiliation with the Society was not embodied in the original telegraphic transmission. It should also be noted that on the next day, October 17, another Memphis newspaper carried a copy of the telegram to the President with the sender's statement that this "was not an official action of the Society."

In order to make the position of the Society clear the Council authorized the Society's President to send the following telegram to the President of the United States and the Secretary of Agriculture:

PRESIDENT OF THE UNITED STATES,
WASHINGTON, D. C.

THE WIRE OF OCTOBER 15 ADDRESSED TO THE PRESIDENT OF THE UNITED STATES AND SECRETARY OF AGRICULTURE BY SHIRLEY W. ALLEN, CHAIRMAN OF CONSERVATIONISTS FOR STEVENSON-KEFAUVER IS IN NO WAY AN OFFICIAL OR UNOFFICIAL EXPRESSION OF THE SOCIETY OF AMERICAN FORESTERS AS MIGHT HAVE BEEN IMPLIED IN THE OCTOBER 16 ISSUE OF THE MEMPHIS COMMERCIAL APPEAL NEWSPAPER STOP THE SOCIETY OF AMERICAN FORESTERS IS A NONPARTISAN AND NONPOLITICAL ORGANIZATION OF PROFESSIONAL FORESTERS.

DEWITT NELSON

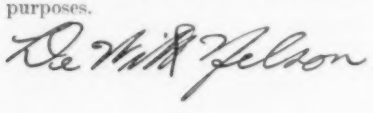
Under date of November first I received the following telegram from the Secretary of Agriculture:

DEWITT NELSON, PRESIDENT,
SOCIETY OF AMERICAN FORESTERS.

THANK YOU FOR YOUR RECENT TELEGRAM TO THE PRESIDENT AND SECRETARY BENSON DISASSOCIATING THE SOCIETY OF AMERICAN FORESTERS FROM ANY CONNECTION WITH THOSE WHO SEEK TO MAKE CONSERVATION OF OUR NATION'S NATURAL RESOURCES A POLITICAL ISSUE. EVERY CITIZEN REGARDLESS OF HIS POLITICAL AFFILIATION HAS A PERSONAL STAKE IN CONSERVATION. THOSE WHO WOULD MAKE POLITICAL CAPITAL OF THIS VITAL AREA DO A DISSERVICE TO NATURAL RESOURCE CONSERVATION. THIS ADMINISTATION HAS REPEATEDLY MADE KNOWN BY WORD AND DEED ITS STRONG SUPPORT FOR RESOURCE DEVELOPMENT AND USE WITHIN THE FRAMEWORK OF SOUND CONSERVATION AS DETERMINED BY PROFESSIONAL CAREER PERSONNEL OF THE AFFECTED FEDERAL DEPARTMENTS. IN THE DEPARTMENT OF AGRICULTURE THE FOREST SERVICE ITS PERSONNEL AND THEIR WORK ARE WELL KNOWN TO YOU AND THE SOCIETY OF AMERICAN FORESTERS. THIS ADMINISTRATION REGARDS THE FOREST SERVICE VERY HIGHLY AS WE ARE SURE YOU DO. FEDERAL STATE AND PRIVATE FORESTRY TOGETHER ARE MAKING OUTSTANDING PROGRESS IN MANAGEMENT OF THE NATION'S FOREST RESOURCES ON THE SOUND PRINCIPLE OF SUSTAINED YIELD AND MULTIPLE USE. WE WISH THIS PROGRESS TO CONTINUE. THE FOREST SERVICE CONTRIBUTION TO THIS PROGRESS IS WE BEIEVE EXCELLENT. ITS PERSONNEL IS MADE UP OF DEDICATED CAREER PEOPLE. THERE HAS BEEN NO CHANGE IN THE CAREER SYSTEM AND LEADERSHIP OF THE FOREST SERVICE AND NONE IS CONTEMPLATED BY THIS ADMINISTRATION.

EZRA TAFT BENSON,
SECRETARY OF AGRICULTURE

The Society of American Foresters is a nonpartisan and nonpolitical organization. Any exploitation of Society prestige to secure political or personal gain constitutes a serious breach of ethics. It was the judgment of the Council that I tell this story in my column in order to clarify the situation. This will remind you that we have a Code of Ethics, that every member should be familiar with it, and that we have a solemn obligation to live and work by it. The Society is an organization of professional foresters who have joined together for professional purposes.



Bylaw 6—What Does and Should It Mean?

We are now approaching the end of five years of operation of Bylaw 6. At the time of its adoption I expressed the hope that during the decade following its adoption we would progress gradually toward somewhat stricter requirements for admission to Junior Membership in the Society immediately following graduation from an accredited school of forestry. On this basis alone, Bylaw 6 deserves review. However, my main reason for bringing up the subject at this time is that during the past year I have personally observed three areas of serious misunderstanding of the intent of the bylaw. If these areas of misunderstanding are typical of a fairly large number of members, we are not making sufficient progress toward possible needed future changes in the bylaw.

In effect, Bylaw 6 simply states the bedrock subject matter in forestry which a candidate for Junior Membership must have had if he is to be accepted for membership solely on the basis of graduation from an accredited school.

The concern over this avenue of induction into the Society arose largely because of the rapid increase in the number of specialized curricula which had developed in the forestry schools during the decade prior to 1950. These curricula covered such fields as range management, wildlife management, recreational management, city forestry, forest products (or wood technology), light building construction, and pulp and paper manufacture. Many of these curricula had their initial form as elective courses in the forestry curriculum. As they expanded into curricula, the need for providing professional courses pertinent to each of the specialized fields necessitated the deletion of forestry courses.

By 1950 this development had reached the point where some of the specialized curricula had retained, at best, a negligible amount of forestry subject matter. Therefore, the Society was confronted with the anomalous situation of accepting as Junior Members, immediately following graduation, those who had taken very little or no forestry in their educational training, merely because they had pursued their highly specialized curricula in an accredited forestry school, and of denying membership, immediately following graduation, to those who had pursued a substantial forestry curriculum in a school not yet accredited. It was believed that the latter could make a more solid contribution to forestry discussion, from a professional standpoint, than could the former.

It is not necessary to the present discussion to recount all the steps by which we arrived at the present form of Bylaw 6. It will suffice to say that the complete discussion covered the period from 1948 to 1952. During the period just prior to the adoption of Bylaw 6 in its present form, the discussion was very thorough and at times quite heated. It is evident, however, that, in spite of thorough and heated discussion, there are at least three points of misunderstanding.

Points of Misunderstanding

These three points of misunderstanding are that Bylaw 6 (1) was designed to keep specialists in the field of forest products out of the Society, (2) expresses the Society's idea of minimum full educational training in professional forestry, and (3) automatically accredits any complying curriculum in an institution in which the forestry curriculum is accredited. These points of misunderstanding will be considered separately in the discussion which follows.

It must be pointed out again, as it was at the time of its adoption, that Bylaw 6 does not deny membership to anyone. It was designed only to set forth the bedrock educational requirements for those who wish to become members of the Society *immediately following graduation* from an accredited forestry school. In reality, Bylaw 6 simply puts into definite language the principle that has always applied—that those who are lacking in formal professional forestry education must qualify for membership on the basis of experience.

Those of us who are concerned with the changes in Bylaw 6 had in mind all of the highly specialized curricula and not just that in forest products. But for some reason which I have never been able to rationalize to my satisfaction, the quantity and degree of opposition from those in forest products was much more pronounced than it was from those in such fields as range management and wildlife management. It was thought by all of us participating in the discussion that the thoroughness of that discussion prior to the adoption of Bylaw 6 in its final form had straightened out this thinking.

However, a member of the Society, as recently as a month ago, expressed to me his concern over "the discrimination of the Society against the forest products specialists in its membership policy." The same member went on to say that forestry and foresters need the specialists in forest products and wood technology. Certainly, we must admit the validity of this statement. With the large number of new professions that have emerged in the United States during the last 25 years, it would be surprising if there were not a high degree of interdependence among many of the professions.

But the fact that forestry needs specialists in forest products and wood technology does not make every wood technologist a forester. It is equally true that wood technology needs forestry and foresters if it is to continue to exist. But by the same token, every forester is not a wood technologist.

In the early days of forestry education in the United States, there was, in reality, only one curriculum in each forestry school. The initial specialization consisted of at most a few courses. As a consequence, every graduate of a forestry school displayed a solid, large amount of professional forestry subject matter in his educational training.

In other words, every graduate of a forestry school could say, with justice, that he was a forester. Under the circumstances, even though there was an early trend on the part of many foresters toward specialized activities following graduation, there was such a large area of common educational foundation among all forestry school graduates that all could with justification become members of the professional forestry society.

But the ever-increasing degree of specialization in certain curricula, with the accompanying deletion of forestry courses, has changed all this. The question is now, how are we to maintain the Society of American Foresters as a truly professional organization?

As I see it, Bylaw 6 is an interim device to maintain some small degree of common professional knowledge among members and at the same time allow highly trained specialists to become members on the basis of education, just as their predecessors had done before the curricula from which they graduated become so highly specialized. With this in mind, Blyaw 6 might be described as an attempt at preventing too sudden a change in membership policy so far as the forestry schools are concerned. Moreover, it was believed by those who contributed to the drafting of Bylaw 6 that the time was not far distant when the graduates of a number of specialized curricula nurtured in forestry schools would wish to form professional organizations of their own.

Courses vs Curriculum

The second of the areas of misunderstanding, namely, that Bylaw 6 expresses the Society's idea of minimum, full professional training in forestry seems utterly impossible of being a serious viewpoint to anyone who has had the opportunity to examine other professional curricula. Bylaw 6 pinpoints a total of 15 quarter-units of professional courses in forestry. This is much less than the minimum stated for any professional curruculum in any college catalog in the United States. These 15 units comprise 8⅓ percent of the total units required for graduation from most collegiate institutions.

However, I have heard forestry school faculty members make statements which indicate that they interpreted Bylaw 6 as expressing minimum full professional training. More recently, in the licensing act for professional foresters in Michigan, the courses named in Bylaw 6 are enumerated as indicative of the educational training of a forester. Certainly, at this time when the demands on professional foresters are becoming ever more exacting, we should consider the essential education of a forester as being far beyond the statement of Bylaw 6. If we continue to hold the viewpoint that Bylaw 6 expresses minimum full professional training, can we blame the public if it is confused and possibly hold us and the profession in low esteem?

Scope of Accrediting

The third area of misunderstanding was brought into sharp focus at the meeting of Council of Forestry School Executives, held in conjunction with the Society meeting at Portland, Oregon in 1955. A number of the executives, more recently inducted into office, expressed surprise that the Committee on Accrediting (now Committee for the Advancement of Forestry Education) accredited curricula and not schools. This viewpoint was brought out into the open when one executive asked that the Society take the lead in accrediting all curricula offered by each of the forestry schools.

For the Society of American Foresters to attempt to accredit all curricula offered in the forestry schools would be decidedly presumptuous. It would be so considered by not a few members of the American Society of Range Management, the Wildlife Society, and the Forest Products Research Society.

On the other hand, it is easy to understand the viewpoint of those who think that the Society's policy on accreditation is one of continuing to accredit schools and thus all curricula offered by the schools. At the time of the first examination of forestry schools for accreditation in 1932, there was, to my knowledge, only one specialized field covered by a bona fide curriculum. The other specialized fields were still in the formative stage, consisting of a relatively small number of courses within the forestry curriculum. The progress toward the present status of a multiplicity of specialized curricula was so gradual that many foresters have continued to consider forestry schools in the light of pre-1932 conditions.

Our Professional Character

All of the foregoing discussion and the recommendations which follow are predicated on the assumption that forestry is a profession and not just a wide area of activity covering many specialties concerned with trees or factors of the land on which they grow. A professional character was quite evidently the objective of those who were instrumental in founding the Society.

It goes without saying that, at this time when the converters of standing timber are becoming more and more concerned with continuity in the supply of their raw materials, we should be equally concerned about the basic objectives of our Society. Currently, I am serving as chairman of the Subcommittee on Redwood Research of the Northern California Section. One of the advisory members of the subcommittee is the executive of one of the large redwood companies. He views the crying need of research as being stand regeneration. I am sure that the Sierra pine region operators would second this viewpoint most heartily.

I doubt that this viewpoint is confined solely to California. A few years ago a joint statement issued by the executives of Southern forestry schools pointed out the very high percentage of forest lands in the South still falling short of potential pro-

duction. At the annual meeting at Milwaukee in 1954, a paper presented by the executive of a large pulp and paper company pointed out the challenge to foresters to get increased production from the lands entrusted to their care of the pulp producers were to meet the problem of decreasing radii of the "woodsheds" of their plants brought about by the competition of new plants being constructed each year in the Lake States.

In short, it appears that we foresters are "on the spot" as never before and also over a rather wide geographical area. Can we measure up to our responsibilities to the public in making forest lands produce up to their full potential in crops of trees, in sizes and species demanded by the conversion industries, all against a background of the economic factors involved? I am convinced we can and will but we must see to it that our professional society measures up to its basic objectives. It is not inconceivable that we may fail if our professional society continues to satisfy a membership ranging all the way from range management on the one hand to the chemical phases of wood technology on the other. Perhaps it is even possible that to safeguard our professional responsibilities we should not continue to give the same emphasis to such fields as recreation, wildlife, and public relations as we do to silviculture and forest management, in our subject matter divisions.

It is not my intention in this discussion to pretend to have the answers to the future conduct of the Society of American Foresters. I can only contribute to the discussion. In this light, it is my strong conviction that the Society must offer stronger professional leadership in meeting the growing demands on professional foresters.

As an important step in this direction, I suggest a stronger statement as to educational requirements for those who aspire to membership immediately following graduation from a professional forestry curriculum. This will serve to give greater emphasis to what I believe are the basic objectives of the Society, and to give a suitable foundation for stronger professional discussion in the Society meetings and the pages of the JOURNAL. At the same time the general public and our own members cannot erroneously assume that we take the professional requirements of our profession lightly.

A Period of Transition

At this time when we are quite evidently in a transition period of our profession, we must admit that the Society cannot ignore the fact that many forestry schools are faced with the responsibility of offering specialized curricula in fields adjunctive to and important to forestry. It is only within the forestry schools that many of these curricula will receive the sympathetic development that they deserve.

The Society, with its background of nearly 25 years of experience in accrediting, should exert some leadership in the strengthening of these curricula, but not through attempting to offer direct examination for accrediting purposes. The initial step of leadership should be to suggest to these other specialized groups that their representatives sit down with the representatives of the Society to consider the possibility of joint accreditation. Such a procedure would be of help to the newer professional groups and at the same time could lead to eventual accreditation of schools rather then curricula.

This possibility was explored by the Society a few years ago with the representatives of range management and wildlife management. At that time the majority of the members of these two groups considered that they were not yet ready for accrediting activities. It is time now that the matter should be explored more formally through Council action.

In conclusion, may I repeat, it was not the intention of Bylaw 6 to remain for an indefinite period as a statement of one aspect of the membership policy of the Society. There are still areas of confusion and misunderstanding in the interpretation of this bylaw. If we are to make progress toward a stronger statement of the educational requirements for membership, we should renew our discussion of this bylaw with the objective of both removing the misunderstanding and at the same time opening up constructive suggestions for its future form.

MYRON KRUEGER
Professor of forestry emeritus, University of California; Formerly chairman, Committee for the Advancement of Forestry Education.

(*Editor's note.*—For a proper understanding of the foregoing statement by Dr. Krueger, both Bylaw 5 and Bylaw 6 follow.)

Affiliate Member Grade

5. Requirements for Affiliate grade: Training in forestry, or in related fields in wildland management or forest utilization, but of insufficient quantity to meet the requirements of the Junior Member grade, is the basic requirement.

Class A. Graduates of institutions which offer forestry curricula, but which have not been accredited by the Council of the Society, shall be eligible provided their instruction has included not less than one 3 quarter-credit course in each of the following subjects: silviculture, forest management, forest protection, forest economics, and wood utilization.

Class B. Persons who have had at least six years of practical training, or a combination of practical and theoretical training equalling at least six years, shall be eligible. Each academic term of appropriate theoretical training at ranger, vocational, or professional forestry schools may be substituted for one year of practical training up to a maximum of two years. Qualifying forestry experience, which may be considered as meeting the practical training requirements, shall be obtained while the applicant is regularly engaged in growing forests, with attendant duties such as management or protection of forest areas, supervision of silvicultural requirements in logging, erosion control, or similar forestry activities; regularly engaged in related wildland activities such as range, wildlife, or recreation management; or regularly engaged in those phases of utilization having a relation to the growing of forest crops.

Class C. Graduates of institutions which have been accredited by the Council of the Society, who have majored in wood utilization, wood technology, wildlife management, or range management where these curricula do not include all the five professional courses (silviculture, forest management, forest protection, forest economics, and wood utilization or technology) shall be eligible.

Junior Member Grade

6. Requirements for Junior grade: Theoretical training in the fundamental principles of professional forestry is the basic requirement.

Junior Membership is the temporary, probational, entrance grade for professionally trained foresters.

Class A. Graduates of approved curricula in institutions accredited by the Council of the Society shall be eligible on the endorsement of three voting members.

For a curriculum to be approved it must include not less than one 3 quarter-credit course in each of the following subjects: silviculture, forest management, forest protection, forest economics, and wood utilization.

Class B. Affiliate Members, who have had two additional years of qualifying forestry experience since being elected

to the Affiliate grade, shall be eligible for election to the Junior Member grade on the endorsement of the Sections in which they are domiciled, provided that satisfactory evidence is submitted that during their total experience they have gained a knowledge of all the professional courses included as a minimum in an approved curriculum in an accredited forestry school.

Wisconsin-Michigan Section Has Summer Meeting

The summer meeting of the Wisconsin-Michigan Section held September 14-15 at Shawano, Wis., was attended by 200 members. Chairman T. D. Stevens presided.

The technical sessions and field trips were centered around the forestry activities on the Menominee Indian Reservation.

The following resolution was adopted by the Section on September 15:

"Whereas: Almost one-tenth of the sawlog volume in the State of Wisconsin stands on ten contiguous townships comprising the Menominee Indian Reservation,

"And whereas: The Congress of the United States has provided for the termination of Federal Control and supervision over the trust and restricted properties of the Menominee Indians, effective December 31, 1958,

"And whereas: Tribal property consists mainly of a sustained-yield forest capable of contributing substantially to the stability and welfare of the Indian community, as well as to that of the general region in which the property is located,

"And whereas: Regardless of any possible future change in ownership, the Menominee property will most readily provide employment to the Indians in the woods and mills, and best contribute to the economy of the State and Nation if it continues to be operated as an integral commercial sustained-yield unit,

"And whereas: Within the Menominee forest property there are certain limited areas of exceptional scientific and scenic value that would best be preserved by means of public ownership,

"Be it therefore resolved: That the Members attending the Summer, 1956 Meeting of the Wisconsin-Michigan Section of the Society of American Foresters recommend that, regardless of the decision of the Menominee Indian Tribe to hold or to dispose of their reservation lands these lands should be maintained and operated in the future as an integral sustained-yield unit, and, most specifically, in no event should they be sold to different buyers in small units."

The legislative committee of the Section recommended that two subcommittees be formed—one in each state of the Section—and that study of the Section's legislative needs be considered as well as national legislation, affecting forestry. A Section member was appointed to work with the national Committee for the Preservation of Natural Areas.

During 1956 a directory of foresters in the Wisconsin-Michigan Section was published as were four papers on genetics. The winter meeting (1957) will be held in mid-March in Iron Mountain, Michigan.

The Section also took the following actions:

1. That the membership class of Associate Section members should be eliminated.

2. That the dues for Affiliate members of the Society should be the same as for Junior members ($6) with periodic increases to a maximum of ($12) in six years, as now provided in the Society's Constitution and Bylaws.

3. That the dues of the Associate member grade ($6) should not be changed.

Coming Events

Western Forestry & Conservation Association

The 47th annual forestry conference with the theme "Forest Management" will be held December 5-7, Empress Hotel, Victoria, B. C.

Southeastern Section

The Southeastern Section will have its first meeting of the coming year January 24-25 in Athens, Ga.

Upper-Mississippi Valley Section

The winter meeting of the Upper-Mississippi Valley Section is scheduled for February 1 and 2 in Memorial Union, Iowa State College, Ames, Iowa.

North American Wildlife Conference

The 22nd North American Wildlife Conference will be held March 4-6, 1957, in the Statler Hotel, Washington, D. C.

Forest Products Research Society

F.P.R.S. will hold its national meeting June 24-27, 1957 in Buffalo, N. Y.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatements received in the Society office during the month of October are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of January 1, 1957. Communications from voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY

Erbeck, W. A.
Fry, F. L.
Galvin, N. J.
Heilig, R. E.
Hess, W. L.
Kost, R. F.
Lease, R. E.
Mortimer, C. R.
Neumann, F. P.
O'Connell, M. W.
Peace, M. R.
Posca, D. L.
Seesholtz, D. H.
Sones, V. B.
Uivary, J. S.
Voelker, R. M.

Junior Grade

Balmer, H. E. 325 N. Pine St., Lancaster, Pa.; Pa. State, B.S.F., 1956. (Student 1954).

Somes, H. A., Forestry Aide, U.S.F.S., New Lisbon, N. J. (Affiliate 1953).

Member Grade

Best, H. C., Asst. Dept. Mgr., Armstrong Forest Co., Lock Haven, Pa.; Pa. State, B.S.F., 1950. (Junior 1951).

Byrnes, W. R., Instructor, Pa. State, University Park, Pa.; Pa. State, B.S.F., 1950; M. F., 1952. (Junior 1952).

Enslen, R. H., Research Engineer, Johns-Manville Corp., Finderne, N. J.; Purdue Univ., B.S.F., 1951. (Junior 1951).

Kantz, B. Forester, Pa. Dept. of Forests & Waters, Wellsboro, Pa.; Pa. State, B.S.F., 1951. (Junior 1952).

Keiling, F. S., Forest Supt., Panther State Forest, Panther, W. Va.; N. C. State, B. S. F., 1953. (Junior 1953).

Keiling, R. E., Forester, J. P. Hamer Lbr. Co., Kenova, W. Va.; N. C. State, B.S.F., 1953. (Junior 1953).

Middleton, J. B., Forester, Pa. Electric Co., Johnstown, Pa.; Pa. State, B.S.F., 1950. (Junior 1952).

Sohaney, A. L., Forester, Gilbert Lbr. Co., Gilbert, W. Va.; W. Va. Univ., B.S.F., 1951. (Junior 51R55).

Appalachian Section

Student Grade

DUKE UNIVERSITY

Row, C.
Woodward, C. F.

NORTH CAROLINA STATE COLLEGE

Alexander, W. M.
Brown, R. A.
DeCoste, J. H.
Donegan, A. W.
Eakins,, T. A.
Erwin, H.
Fortin, J. B.
Grady, C. R.
Gurganus, R. F.
Harding, C. B.
Hilbourn, T. O.
Hills, C. C.
Hollowell, A. R.
Koenig, T. S.
Kunselman, M. B.
Lively, J. H.
Sawyer, G. E. J.
Simmons, R. C.
Smith, E. R.
Thompson, D. M.
Torrence, D. L.

Junior Grade

Nicholson, J. E., Rt. 2, Franklinton, N. C.; N. C. State, B.S.F., 1954. Reinstatement.
Stingley, J. M., Forester, Williams McKeithan Lbr. Co., Pollocksville, N. C.; N. C. State, B.S.F., 1935. Reinstatement.
Turner, H. G., Area Forester, W. Va. Pulp & Paper Co., Darlington, S. C.; N. C. State, B.S.F., 1950.

Member Grade

Gustafson, R. E., Consulting Forester, Eastern Forestry Co., Hertford, N. C.; Univ. of Mich., B.S.F., 1950. (Junior 1951).
Howell, W. E., Forester, U.S.F.S., Murphy, N. C.; Univ. of Fla., B.S.F., 1942. (Junior 1950).
McElwee, R. L., Liaison Geneticist, N. C. State, Raleigh, N. C.; W. Va., B.S.F., 1951. (Junior 1951).

Affiliate Grade

Howell, M. R., Forestry Aide, Champion Paper & Fibre Co., Canton, N. C.

Central Rocky Mountain Section

Student Grade

COLORADO A & M COLLEGE

Adair, K. T. — Schroeder, J. G.
Feller, L. F. — Wilson, R. K.

Member Grade

Edstrom, N. A., Forester, U.S.F.S., Denver, Colo.; Mont. State, B.S.F., 1953. (Junior 1953).
Herold, J. H., Dist. Forester, Bureau of Land Mgmt., Casper, Wyo.; Univ. of Wash., B.S.F., 1952. (Junior 1952).
Jones, S. H., Forestry Asst., Weyerhaeuser Tbr. Co., Denver, Colo.; Colo. A & M, B.S.F., 1952; Univ. of Wash., M.F., 1954. (Junior 1952).

Affiliate Grade

Sims, W. M., Asst. Admissions Officer, Colo. A & M, Fort Collins, Colo.; Colo. A & M, B.S. (Forest Recreation), 1954.

Central States Section

Student Grade

PURDUE UNIVERSITY

Ashworth, J. T. — Harshbarger, T. R
Baltzell, J. T. — Hehenberger, D. T.
Baumgardner, R. E. — Hinton, O. W.
Brundage, R. S. — Hutchinson, J. S.
Clawson, G. L. — Norton, L. L.
Corsmeier, F. A. — Robinson, O. H.
Cummings, W. H. — Schultz, R. D.
Girton, D. S. — Sharp, B. G.
Dearth, T. F. — Whittaker, J. C.
Harlan, R. D. — Wolf, J. B.

Junior Grade

McCauley, O. D., Research Forester, Central States Forest Expt. Sta., Columbus, Ohio; W. Va. Univ., B.S.F., 1949.
Overholt, D. P., Soil Cons. Service, Athens, Ohio. Reinstatement.
Parrish, A. T., Forestry Extension Specialist, Purdue Univ., Albion, Ind.; Purdue Univ., B.S.F., 1942.

Member Grade

Johnson, W. F., Log buyer, Hoosier Veneer Co., Inc., Indianapolis, Ind.; Purdue Univ., B.S.F., 1950. (Junior 1950).

Affiliate Grade

Goodman, J. B., Forester, Commonwealth Edison Co., Maywood, Ill.; Mich. College of Mines & Tech., B.S. (Forestry), 1950.

Columbia River Section

Student Grade

OREGON STATE COLLEGE

Bowden, D. L. — Petersen, D. M.
Clayton, J. M. — Schaaf, R. C.
Cramer, R. W. — Simes, H. L.
Geiger, P. H. — Torkelson, F.
Hale, M. R. — Trail, L. D.
Hamilton, R. J. — Wade, L. R.
Johnston, J. T.

Junior Grade

Bateman, L. K., Yield Tax Supv., State Tax Comm., Salem, Ore.; Ore. State, B.S.F., 1947.
Wojtowych, J., Forester, U.S.F.S., Estacada, Ore.; N. Y. State Univ., B.S.F., 1954.

Member Grade

Austbo, J. A., Forester, Bureau of Land Mgmt., Medford, Ore.; Univ. of Minn., B.S.F., 1952. (Junior 1952).
Brown, R. L., Asst. Logging Engineer, Harbor Plywood Corp., Riddle, Ore.; Univ. of Calif., B.S.F., 1950. (Junior 1951).
Burr, A. L., Forester, Bureau of Land Mgmt., Salem, Ore.; Univ. of Wash., B.S.F., 1952. (Junior 1952).
Dobbins, F. D., Forester, Booth-Kelly Lbr. Co., Springfield, Ore.; Univ. of Wash., B.S.F., 1950. (Junior 1951).
Dolato, M. C., Forest Engineer, Bureau of Land Mgmt., Salem, Ore.; Mont. State, B.S.F., 1953. (Junior 1953).
Dzwrissin, A. F., Forester, U.S.F.S., Enterprise, Ore.; N. Y. State Univ., B.S.F., 1953. (Junior 1953).
Frost, D. O., Foad Design Engineer, U.S.F.S., Portland, Ore.; Ore. State, B.S.F., 1952. (Junior 1952).
Hart, J. E., Forester, Bureau of Land Mgmt., Roseburg, Ore.; Univ. of Calif., B.S.F., 1952. (Junior 1952).
Hohenhaus, R. A., Timber Appraiser, Lane County Ore., Eugene, Ore.; Ore. State, B.S.F., 1952. (Junior 1952).
McDowell, H. G., Forester, Bigley & Fess Foresters, Inc., Eugene, Ore.; Univ. of Wash., B.S.F., 1949. (Junior 1949).
Rouse, W. R., Asst. Dist. Forester, Bureau of Land Mgmt., Coos Bay, Ore.; Univ. of Wash., B.S.F., 1951. (Junior 1951).
Schrager, M. H., Forester, Contract Logging Supv., Seaside, Ore.; Ore. State, B.S.F., 1951. (Junior, 1951).
Seamount, D. T., Logging Engr., Crown Zellerbach Corp., Cathlamet, Wash.; Univ. of Calif., B.S.F., 1950. (Junior 1951).
Sorseth, A. L., Dist. Ranger, U.S.F.S., Detroit, Ore.; Ore. State, B.S.F., 1948. (Junior 1951).

Affiliate Grade

Heede, B. H., Forester, Glide Lbr. Co., Roseburg, Ore.
VanCise, C. E., Contract Logging Supv., Crown Zellerbach Corp., Tillamook, Ore.
Vose, E. L., Cruiser, Crown Zellerbach Corp., Seaside, Ore.

Associate Grade

Doyle, J. F., Area Adm., U.S.D.I., Portland, Ore.

Gulf States Section

Student Grade

LOUISIANA POLYTECHNIC INSTITUTE

Boyd, W. L. — Thomas, M.
Joiner, W. T. — Wells, W. K.
Lacroix, C. M. — Wootten, G. H.
Mathys, E.

LOUISIANA STATE UNIVERSITY

Anderson, K. A. — Harper, D. L.
Burchfield, O. K. — Lambert, D. F.
French, A. O. — McLemore, B. F.
Gaddis, B. T. — Morgan, A. E.
Gillespie, K. L.

Junior Grade

Grigg, E. J., Asst. Dist. Forester, Gair Co., Inc., Winnfield, La.; L.P.I., B.S.F., 1953.
Guy, J. D., Forester, James M. Vardaman & Co., Laurel, Miss.; A.P.I., B.S.F., 1949.
Mullin, C. E., Box 42, Simsboro, La.; L.P.I., B.S.F., 1956. (Student 1955).

Member Grade

Grillot, I. F., Forester, W. T. Carter & Bros. Lbr. Co., Camden, Texas; La. State, B.S.F., 1950. (Junior 1952).
Lehmann, A. F., Chief Forester, Angelina County Lbr. Co., Keltys, Texas; Iowa State, B.S.F., 1934. Reinstatement.
Oliphant, L. M., Asst. Dist. Ranger, U.S.F.S., 1953. (Junior 1953).
Rochester, J. U., Dist. Forester, Lutcher & Moore Lbr. Co., DeRidder, La.; La. State, B.S.F., 1950. (Junior 1953).
Romero, L. H., Asst. Chief Fire Control, La. Forestry Comm., Baton Rouge, La.; La. State, B.S.F., 1949. (Junior 1952).
Smith, H. W., Field Asst., International Paper Co., Springhill, La.; Univ. of Mo., B.S.F., 1953. (Junior 1953).
Sykes, C. K., Forester, U.S.F.S., Jackson, Miss.; Univ. of Fla., B.S.F., 1947. (Junior 1951).
Weidner, R. G., Project Forester, U.S.F.S., Hernando, Miss.; Mich. State, B.S.F., 1951. (Junior 1951).

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO

Cornell, B. L. — Wilson, D. D.
Hook, J. R.

Intermountain Section

Student Grade

UTAH STATE AGRICULTURAL COLLEGE

Carpenter, B. H. — Johnson, W. J.
Daniels, R. H. — Kennedy, J. P.
Dempsey, J. M. — Kyselka, J. V.
Dolph, R. E. — Rushton, S. M.
Duda, T. M. — Scott, N. C.
Dutton, D. W. — Scott, S. A.
Elliott, T. D. — Smith, R. S.
Gurr, G. R. — Stewart, J. B.
Hassell, M. J. — Stone, G.
Hickman, J. L. — Thompson, J. E.
Hooper, D. H.

Kentucky-Tennessee Section

Junior Grade

Currence, W. F., Forestry Asst., Hiwassee Land Co., Calhoun, Tenn.; N. C. State, B.S.F., 1950.

Ridgway, C. D., Forestry Asst., Hiwassee Land Co., Kingston, Tenn.; Univ. of Mich., B.S.F., 1953.

Member Grade

Haskins, E. B., Forester, Arnold Research Organization, Inc., Tullahoma, Tenn.; Univ. of Ga., B.S.F., 1950. (Junior 1952).

Affiliate Grade

Figart, T. L., Forester, U.S.F.S., Overgaard, Ariz.; Okla. A & M, B.S., (Forestry), 1956.

New England Section

Student Grade

UNIVERSITY OF MASSACHUSETTS

Campbell, A. Duckworth, R.
Castaldini, R. E. Lane, L. F.
Coughlin, J. W. Osgood, W. H.
Derby, J. E.

Member Grade

Kilbreth, H. E., Forestry Consultant, Kilbreth & Son, North Turner, Maine; Univ. of Maine, B.S.F., 1951. (Junior 1951).

Lane, W. N., Self Employed, Forest Mgmt. Consultant, Rochester, N. H.; Univ. of Mass., B.S.F., 1949; M.F., 1950. (Junior 1951).

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK

Miller, R. K.

Junior Grade

Petrie, R. J., Forester, Draper Corp., Tupper Lake, N. Y.; State Univ. of N. Y., B.S.F., 1951.

Member Grade

Eckert, J. J., Forester, N. Y. State Cons. Dept., Middletown, N. Y.; State Univ. of N. Y., B.S.F., 1950. (Junior 1951).

Kissick, N. L., Asst. Prof., Univ. of Toronto Forest, Dorset, Ont., Canada; Univ. of Toronto, B.S., (Forestry), 1948; Yale, M.F., 1951. (Junior 1951).

Affiliate Grade

Berger, C. J., Asst. Production Mgr., M. Goldsmith Co., Brooklyn, N. Y.; State Univ. of N. Y., B.S., (Wood Utilization), 1944.

Cromwell, H. F., Salesman, Catalin Corp. of America, New York, N. Y.; State Univ. of N. Y., B.S., (Utilization), 1951.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA

Batchelder, J. R. Pickering, C. R.
Bates, J. C. Sebring, H. F.
Benediktson, J. B. Seyden, J. H.
Carson, R. D. Skolmen, R. G.
Cheatham, N. H. Troop, J. E.
Isberg, J. L. Tunheim, E. A.
Johnson, R. E. Warnock, J. D.
Lund, R. E. Weinmann, R. G.
MacGregor, R. A. Zachry, J. D.
Owen, D. W.

Junior Grade

Smith, W. F., Forester, J. H. Baxter & Co., San Francisco, Calif.; Ore. State, B.S.F., 1950.

Member Grade

Maben, R. L., Forester, Winton Lbr. Co., Martell, Calif.; Univ. of Calif., B.S.F., 1951. (Junior 1951).

Northern Rocky Mountain Section

Junior Grade

DeBruine, G. R., 219 South Ave. W., Missoula, Mont.; Univ. of Mont., B.S.F., 1956. (Student 1954).

Lantz, D. W., Forester, U.S.F.S., Billings, Mont.; Mont. State, B.S.F., 1953.

Member Grade

Kinsman, E. J., Forester, U.S.F.S., Libby, Mont.; Mich. State, B.S.F., 1952. (Junior 1953).

Miller, J. F., Forester, North Western Pulp & Power, Ltd., Hinton, Alberta, Canada; State Univ. of N. Y., B.S.F., 1951; Yale, M.F., 1953. (Junior 1951).

Morris, B. W., Forester, U.S.F.S., Columbia Falls, Mont.; Mont. State, B.S.F., 1950. (Junior 1952).

Steinhouse, J. E., Forester, Kootenai National Forest, Libby, Mont.; Univ. of Calif., B.S.F., 1952. (Junior 1952).

Weistaner, D. A., Forester, U.S.F.S., Libby, Mont.; Mont. State, B.S.F., 1953. (Junior 1953).

All New Mall
DIRECT DRIVE CHAIN SAW
New RUGGEDNESS... STRONGWALL MAGNESIUM-ALUMINUM ALLOY CASTINGS
Newer EASE OF MAINTENANCE... FEWER PARTS TO SERVICE
Newest COMPACT DESIGN KEEPS ALL CONTROLS FINGERTIP HANDY
PRICES START AT
$195.00
and that's with 12" bar and chain
DEMONSTRATION? WRITE FOR NAME OF YOUR NEAREST DEALER...
MALL TOOL COMPANY
Division of Remington Arms Company, Inc.
7758 South Chicago Avenue
Chicago 19, Illinois
LU-243

A second improved printing

APPLIED FOREST MANAGEMENT

by

PAUL E. BRUNS, M.F., Ph.D.

"Recommended to both the forest manager and the student who seeks an appraisal of the full management job." —J. Walter Giles, in *The Forestry Chronicle.*

383 pages ..... $5 postpaid

PAUL E. BRUNS

Consulting Forester

119 Mount Ave., Missoula, Mont.

Photogrammetric

STEREOSCOPES - STEREOMETERS

SKETCHERS - PLOTTERS

HARRISON C. RYKER, INC.

1209 - 8th Ave. Oakland, Calif.

Rootspred Tree Planters

Standard: Heavy duty planter for tractors with hydraulic lift. Usable on 20 h.p. and up wheel tractors — also on the smaller crawlers. Makes these sites plantable: heavy sod, stony soils, steep hillsides, brushy sites. Equipped with 20" coulter.

M-55: A low cost planter for the easier sites where no hillside adjustment is necessary. At $245 this is ideal for the small Christmas tree grower. Wearing parts same as the "Standard."

Literature sent on request. *Write* ROOTSPRED TREE PLANTER at ST. PETERSBURG, PENNSYLVANIA.

Yahvah, E. L., Foreman, J. Neils Lbr. Co., Rexford, Mont.; Colo. A & M, B.S.F., 1950. (Junior 1951).

Affiliate Grade

Larson, K. R., Forester, U.S.F.S., Troy, Mont.; Mich. College of Mining & Tech., B.S., (Forestry), 1953.

Ozark Section

Junior Grade

Rogers, J. A., Forester, Ozark Badger Lbr. Co., Wilmar, Ark.; Okla. A & M, B.S., (Forestry), 1950. (Affiliate 1952).

Snyder, C. G., Supt., International Paper Co., Camden, Ark. Reinstatement.

Wood, G. W., Edgemont Blv., Perryville, Mo.; Univ. of Mo., B.S.F., 1956. (Student 1954).

Member Grade

Plummer, J. L., Farm Forester, Mo. Cons. Comm., Mtn. Grove, Mo.; Univ. of Mo., B.S.F., 1952. (Junior 1952).

Smalley, G. W., Asst. Dist. Ranger, U.S.F.S., Waldron, Ark.; Mich. State, B.S.F., 1952. (Junior 1952).

Puget Sound

Student Grade

UNIVERSITY OF WASHINGTON

Anderson, D. N.
Berry, W. F.
Carey, W. W.
Emery, D. N.
Pasin, S. J.
Pharis, R. P.
Randall, A. C.

Junior Grade

Lloyd, C. C., 1 W. Alder, Everett, Wash.; Univ. of Wash., B.S.F., 1956. (Student 1956).

Wiedmer, H. A., Asst. Forester, Weyerhaeuser Tbr. Co., Snoqualmie Falls, Wash. (Affiliate 1954).

Member Grade

Herman, K. E., Forest Mgmt. Forester, Wash. State Div. of Forestry, Sedro Woolley, Wash.; Univ. of Idaho, B.S.F., 1952. (Junior 1952).

McCowan, V. F., Forest Entomologist, Weyerhaeuser Tbr. Co., Centralia, Wash.; Univ. of Mich., M.F., 1952. (Junior 1953).

Nelson, W. A., Forester, Webb Logging, Yakima, Wash.; Univ. of Minn., B.S.F., 1950. (Junior 1953).

Taylor, D. J., Dist. Forest Warden Asst. State Div. of Forestry, Olympia, Wash.; Univ. of Wash., B.S.F., 1950. (Junior 1951).

Southeastern Section

Student Grade

UNIVERSITY OF FLORIDA

Ahrens, D. G.
Arthur, J. L.
Corbett, R. L.
Dazey, J. R.
Fraser, T. E.
Jacobs, D. K.
Kidd, P. D.
Kohrt, R. K.
Lewis, D. R.
Olds, W. T.
Patton, D. W.
Roach, J. E.
Rogers, J. P.
Smith, J. E.
Smith, J. M.
Swofford, L. J.
Taylor, V. A.
Watson, H. L.
Young, W. F.

Junior Grade

Charbonneau, D., Wood Buyer, Rayonier Inc., Jesup, Ga.; Colo. A & M, B.S., (Game Mgmt.), 1948. (Affiliate 1953).

Cocke, R. E., Box 3656, Gainesville, Fla.; Univ. of Fla., B.S.F., 1956. (Student 1955).

Hudson, J. L., Dist. Forester, Hiwassee Land Co., Ala. City, Ala.; Univ. of Fla., B.S.F., 1949.

Martin, R. W., Forest Mgmt. Asst., Ga. Forestry Comm., Dry Branch, Ga.; Univ. of Ga., B.S.F., 1949. Reinstatement.

Member Grade

Alford, C. E., Forester, Ga. Timberlands Inc., Macon, Ga.; Univ. of Ga., B.S.F., 1952. (Junior 52R55).

Champion, D. E., Farm Forester, Fla. Forest Service, Starke, Fla.; Univ. of Fla., B.S.F., 1951. (Junior 1952).

Cox, R. L., Pulpwood Dealer, Thomasville, Ga.; Univ. of Ga., B.S.F., 1949. (Junior 1951).

Funderburke, K. P., Chief Forester, Rigesa S/A, Sao Paulo, Brazil; Univ. of Ga., B.S.F., 1950. (Junior 1950).

Kolger, W. A., Forester, Hollingsworth Whitney Div., Scott Paper Co., Mobile, Ala.; Purdue, B.S.F., 1952. (Junior 1952).

Kovner, J. L., Research Forester, Coweeta Hydrologic Lab., Dillard, Ga.; State Univ. of N. Y., M.F., 1949; Ph.D., 1955. (Junior 1951).

O'Leary, D. F., Unit Forester, International Paper Co., Homerville, Ga.; Univ. of Ga., B.S.F., 1951. (Junior 1951).

VanCleave, N. A., Procurement Supv., St. Regis Paper Co., Pensacola, Fla.; A.P.I., B.S.F., 1950. (Junior 1952).

Southern California Section

Junior Grade

Tikkala, W. R., Forester, U.S.F.S., Mentone, Calif.; Univ. of Mich., B.S.F., 1950. (Junior 1951).

Member Grade

Draves, E. E., Dist. Ranger, U.S.F.S., San Luis Obispo, Calif.; Univ. of Calif., B.S.F., 1950. (Junior 1952).

Stevens, C. M., Asst. Dist. Ranger, U.S.F.S., Newhall, Calif.; Ore. State, B.S.F., 1950. (Junior 1951).

Upper Mississippi Valley Section

Student Grade

IOWA STATE COLLEGE

Albrecht, D. J.
Bonyata, R. J.
Ferree, M. E.
Haygreen, J. H.
Kridelbaugh, L. E.
Muntz, H. D.
Nielsen, R. L.
Pillsbury, S. O.
Richardson, D. E.
Rush, P. A.
Saylor, L. C.
Schramm, L. L.
Simpson, H. W.
Smith, R. D.
Stewart, R. E.
Uhr, S. C.
Warner, W. R.

Junior Grade

Brown, R. W., 3306 Ridge Ave., Sioux City, Iowa; Iowa State, B.S.F., 1956. (Student 1956).

Kimble, G. J., Graduate Student, Univ. of Minn.. Minneapolis, Minn.; Univ. of Minn., B.S.F., 1953.

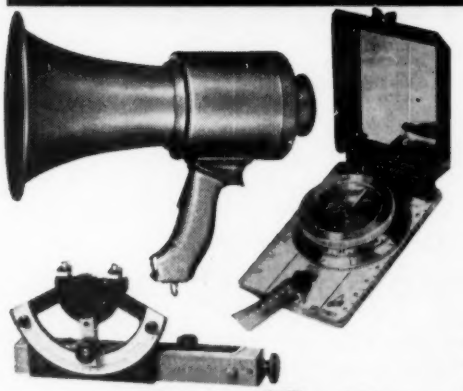
Renaud, R. E., Graduate Student, Iowa State, Ames, Iowa; Iowa State, B.S.F., 1954. Reinstatement.

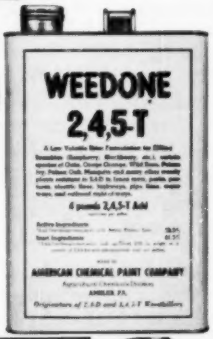
Stapleton, R. A., County Forester, Koochiching County, Littlefork, Minn.; Univ. of Minn., B.S.F., 1951.

Member Grade

Heintz, R. H., Nursery Mgr., N. Dak. School of Forestry, Towner, N. Dak.; Univ. of Fla., B.S.F., 1952. (Junior 1952).

YOU CAN DEPEND ON **Forestry Suppliers**





WE SUPPLY FORESTRY GOODS AND SERVICE

- Compasses
- Diameter Tapes
- Cruising Devices
- Marking Devices
- Tree Calipers
- Pruning Saws
- Increment Borers
- Tree Marking Paint
- Power Tools
- Timber Carriers
- Pedometers
- Snake Bite Kits
- Protective Gear
- First Aid Kits
- Tally Meters
- Lens-Glasses-Scopes
- Tree Planting Tools
- Log Scaling Rules
- Tally Books
- Axes and Machetes
- Fire Suppression Tools
- Surveying Equipment

★ COMPLETE ONE-STOP SERVICE

★ SAME DAY SHIPPING SERVICE

★ LARGEST SELECTION

★ We Pay Postage On All Orders Totaling $5.00 or More

(Except Paint and Chemicals)

FORESTRY SUPPLIERS

INCORPORATED

P. O. Box 8305—BATTLEFIELD STATION—Telephone 4-3565

JACKSON 4, MISSISSIPPI

★ *PHONE, WRITE OR WIRE*

SEND FOR BIG NEW FORESTRY SUPPLIERS CATALOG

FORESTRY SUPPLIERS, Inc.
P.O. Box 8305 Battlefield Station,
JACKSON 4, MISSISSIPPI

Please send me your big, new, 160-page Catalog No. 7.

NAME _____

ADDRESS _____ ZONE _____

CITY _____ STATE _____

Now... Talk through noise

NEW TRANSISTORIZED POWER VOICE speaker

The secret is in the exclusive **"GOLDEN HEART"** *transistor*

Hear your mobile radio

HUNDREDS OF FEET AWAY

Now your vehicles, in fact any mobile radio equipped vehicle, can get far greater volume than ever before, with the new Motorola transistorized Power Voice Speaker.

This new compact, inexpensive speaker-amplifier combination delivers 10 TIMES MORE POWER than the conventional passive speaker. No more straining to hear messages. Just turn it up—it's got all the volume you'll *ever* need, all in this one small package. No longer is your driver shackled inside his vehicle...he can move about freely, hundreds of feet away, and still hear his dispatcher.

Secret of Motorola's newest development is the built-in transistorized amplifier, utilizing two long-life, Motorola power transistors. With the average 12 volt mobile radio system, the new speaker develops *15 watts* audio output. Even on a 6 volt system, you get 5 watts output—*much* more than the conventional one watt speaker level.

This power packed speaker is available for your mobile 2-way radio NOW. It can be quickly and easily added to most 6 or 12 volt installations. With the new Power Voice Speakers doing a bigger, better job for you, you'll also find low battery drain, bandpass response that accents voice frequencies, and versatile Quick-detach mounting...in a compact, all-metal housing.

You must *hear* the new Power Voice Speaker to appreciate what this added power can mean to *you*. Write, phone or wire today...or mail the coupon below.

New POWER VOICE speaker mounts firmly under dash in same familiar position

BUT...

detaches in a second to be hung from vehicle window and may be heard clearly hundreds of feet away.

MOTOROLA... always FIRST with the NEWEST in TRANSISTORIZED EQUIPMENT

MOTOROLA
2-WAY RADIO

MAIL THIS COUPON FOR LITERATURE
or a demonstration

Motorola Communications & Electronics, Inc., Dept. I1
4501 Augusta Blvd., Chicago 51, Ill.

☐ Please send me more information on the new Power Voice Speaker.

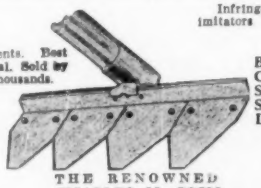
☐ I want to hear a demonstration of the Power Voice Speaker.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



THE RENOWNED
CHARLES H. RICH
"Forest Fire Fighting Tool"
Write for Prices and Descriptions
Geneva Rich Bickel WOOLRICH, PA.

For over ten years
a dependable source
for
Southern Pine Seed

SOUTHERN SEED COMPANY INC.
Baldwin, Georgia

SILVA COMPASS
Simpler — More Accurate
Recommended by foresters for cruising. Easier to use, faster, positive. Direct course readings. *Write for free literature and instructions.*
SILVA, INC., Dept. J, La Porte, Ind.

More Trees . . . Better Stands

NEW DRUG HELPS CONTROL DAMPING-OFF. GIVES AS MUCH AS 100% PROTECTION

The drug that has proven so highly and uniformly effective is SUNOX. College tested and field proven over a period of years, SUNOX is now widely used as a standard procedure in preventing Rhizoctonia-caused diseases. A soil fungus, Rhizoctonia solani, ranks as a major agent of damping-off in seed beds and in cutting benches. It attacks liners in the field and mature plants and shrubs in the homeowner's garden.

"We applied SUNOX in a test for control of pre-emergence damping-off on both black and white spruce. Damping-off killed 75% of the seedlings in the control bed, 50% in the recommended treatment and less than 10% in double the recommended measure," reported a large grower in the Mid-west.

"A marked reduction in the mortality of the small trees was noticed immediately after application of SUNOX," another large grower in the South reported. "We made three applications on the affected areas with significantly good results."

ECONOMICAL!
1 lb. of SUNOX makes 320 gallons of treating solution at a cost of 2c per gallon and less. 1 gallon will treat 8 sq. ft. of rooting medium or 4 sq. ft. in the field. Write for prices and literature.

Midvale Chemical Co.
P.O. Box 205 LODI, N. J.

Rawie, C. D., Forester, Minn. Forest Service, Warroad, Minn.; Ore. State, B.S.F., 1928. Reinstatement.
Whipkey, R. Z., Research Forester, U.S.F.S., Amana, Iowa; Pa. State, B.S.F., 1950. (Junior 1951).

Affiliate Grade

Schwankl, C. H., Senior Clerk, Minn. & Ont. Paper Co., International Falls, Minn.

Wisconsin-Michigan Section

Student Grade

MICHIGAN STATE UNIVERSITY

Aggerholm, D. A.	Holman, W. J.
Anderson, A. O.	Lukert, J. L.
Arnold, J. D.	Mackinder, R. C.
Arps, R. H.	Mattson, R. R.
Bradbury, R. D.	McComb, C. R.
Christensen, C. A.	McShane, R. K.
Gabriel, H. W.	Merkel, W. R.
Garrett, P. W.	Miller, N. A.
Goodman, R. J.	Rulison, J. G.
Gross, L. L.	Schimke, A. M.
Hallenius, C. J.	Tarr, W. H.
Hawes, R. W.	Thomas, A. J.

UNIVERSITY OF MICHIGAN

Beaudoin, J. R.	Kost, J. E.
Hale, J. A.	Martin, R. E.
Jessup, D. R.	

Junior Grade

Brunette, A. P., Forester, George Banzhaf & Co., Milwaukee, Wis.; Univ. of Mich., M.F., 1956.
Cooley, J. H. Research Forester, Northern Lakes Research Center, Wausau, Wis.; Univ. of Mich., B.S.F., 1956; M.F., 1956.
Corbin, D. L., Dist. Game Mgr., Wis. Cons. Dept., Wausau, Wis.; Mich. College of Mining & Tech., B.S., (Forest Utilization), 1949. (Affiliate 1953).
Kinghorn, J. H., 14 Church St., Saranac Lake, N. Y.; Univ. of Mich., B.S.F., 1956. (Student 1956).
Mallette, D. H., Forester, U.S.F.S., Middlebury, Vt.; Univ. of Mich., B.S.F., 1956. (Student 1956).
Schneider, G., 1408 Washtenaw Ave., Ann Arbor, Mich.; Univ. of Mich., B.S.F., 1956. (Student 1956).

Member Grade

Essex, B. L., Research Forester, Lake States Forest Expt. Sta., St. Paul, Minn.; Mich. State, B.S.F., 1951. (Junior 1951).
Mac[illegible] P. S., Forester, Gordon State Nursery, Gordon, Wis.; Univ. of Mich., B.S.F., 1951. (Junior 1951).
Rose, D. N., Forester, Consolidated W. P. & P. Co., L'Anse, Mich.; State Univ. of N. Y., B.S.F., 1952. (Junior 1952).
Scher, T. G., Forester, Wis. Cons. Dept., Tomahawk, Wis.; Univ. of Mich., B.S.F., 1952. (Junior 1952).
Strengberg, M. L., Forester, Marathon Corp., Anasa, Mich.; Mich. State, B.S.F., 1941. (Junior 1952).
Turinski, C., Owner-Manager, Bushman & Turinski, Wyocena, Wis.; Iowa State, B.S.F., 1949. (Junior 1951).
Vander Sys, J. T., Asst. Dist. Forester, Mich. Dept. of Cons., Traverse City, Mich.; Mich. State, B.S.F., 1951. (Junior 1951).

Affiliate Grade

Look, R. A., Resident Engineer, Wis. Mich. Power Co., Iron Mountain, Mich.

TO GET ALL THESE SAVINGS In TIME, PAINT, and MONEY

NOZZLE CAP
To prevent paint drying-in — Another Nelson exclusive, saves nightly cleaning.

REVERSIBLE NOZZLE
To eject plugs quickly, cuts "time out" to clear clogged guns.

ADAPTOR AND QUART CAN
Permits screwing can direct to gun — eliminates funnels, canteens and sloppy paint transfers.

NON-SETTLING PAINT
Saves hours wasted in stirring — makes marks that endure and *twice as many per gallon.*

USE BOTH THE NEL-SPOT GUN and NELSON TREE MARKING PAINT

Both save time. Both save paint. Use them together and Nelson's Paint-Can-Gun, "all 3 in one," mark more trees for less money than any other combination of paint and marking tools you can buy.

WRITE — Dept. JF-4

THE NELSON COMPANY
1236 Prospect Avenue
Iron Mountain, Michigan

Forestry News

A. F. A. Holds Annual Meeting

The 81st annual meeting of the American Forestry Association was held October 1-4 at La Plata, Md., in conjunction with the Maryland Department of Forests and Parks which this year celebrated the fiftieth anniversary of Maryland's forestry program.

The theme of the meeting was "America's Small Woodlands." This subject was discussed by professional foresters, leaders of industry and government, and woodland owners at a full day session which was followed by three days of field trips. Over 400 persons were in attendance.

At the meeting banquet on the evening of October 2 American Forestry Association Distinguished Service Awards were presented to five leaders in the field of conservation. Recipients of awards were as follows: Dr. Paul De Leon Sanders, editor of the *Southern Planter*, in the field of public information; Dr. Herman Haupt Chapman, professor emeritus, Yale University School of Forestry, in the field of education; Gustave P. Backman, executive secretary of the Salt Lake City Chamber of Commerce, in the field of business and industry; George Harris Collingwood, analyst in conservation and natural resources of the Legislative Reference Service of the Library of Congress, in the field of general service; and Governor Frank J. Lausche of Ohio, in the field of public servants. Both H. H. Chapman and Harris Collingwood are well know professional foresters.

Second Canadian National Forestry Conference Held

Over two hundred delegates from government, business, and public organizations attended the 2nd National Forestry Conference held in Winnipeg, Manitoba September 17-19. The conference was called for the purpose of increasing public information on the value of Canada's forests in the Canadian economy and was co-sponsored by The Canadian Chamber of Commerce, The Canadian Institute of Forestry, and The Engineering Institute of Canada with The Canadian Forestry Association. Beside distributing information on the forestry situation, the meeting provided opportunity for discussion between government representatives, industry foresters, and business men of ways and means to improve forest management in Canada. It was proposed that a greatly expanded conference on forestry be called within 18 months by the same co-sponsoring group with the addition of agricultural and educational leaders.

A. A. A. S. Meets December 27-30

The subject of the program of Section O. (Agriculture) of the American Association for the Advancement of Science, meeting at the Hotel Martinique, December 27-30, will be "Grasslands in Our National Life." A total of 18 scientific organizations, including the S.A.F., and 11 industrial organizations are cosponsoring the program.

World Eucalyptus Conference Held

Seventy delegates from 23 countries met in Rome the last two weeks of October at a World Eucalptus Conference called by the F.A.O. to consider ways of meeting wide spread demands for local supplies of wood.

PRUNING IS EASY
WITH THE RIGHT TOOLS

For 45 years Bartlett has specialized in the correct, most efficient tools for every job. Our tools are used by expert tree surgeons all over the world.

Illustrated is a long Pole Trimmer with compound cutting lever for fast, easy action. Side-cutting head leaves clean wounds. 6 to 16 ft. pole lengths. $13.95 to $17.35 delivered in U.S.A. Also available with rope pulley in place of wire pull. (No. 1-W)

ALSO POLE & LOPPING SAWS

No. 27 TREE EXPERT'S SAW

26-in. blade, 6 points per inch, beveled forward. Most popular arborists' saw made. $8.35. Also available in 28-in. length (No. 28) $9.05 delivered in U.S.A.

BARTLETT TREE PAINT

Universally used after pruning to prevent fungus growth. Easily applied with ordinary brush. $5.50 gal. delivered, or $3.50 gal. in case lots of 6. Write for Catalog showing complete line

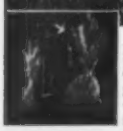
BARTLETT MFG. CO.
3003 E. Grand Blvd. Dept. 15
Detroit 2, Michigan

20 MILLION TREES *a Year!*

Seedlings for Christmas Tree and Forest Tree plantings. Transplants for Conservationists, Timber Operators and Farmers. All from selected seed with good heredity characteristics. Our tremendous volume means wide selection at a *price saving* to you. For example:—

NORWAY SPRUCE—Fast growing
2-yr., 5-10", per 1000 ..... $35.00

Write for Free Catalog
with wholesale planting list. Ask for Free Christmas Tree Growers' Guide.



NOTE: Heavy Roots and Sturdy Tops of Musser Seedlings compared with ordinary seedlings.

MUSSER FORESTS, INC. Box 26-L INDIANA, PA.

The Forester's WORKHORSE

HALE TYPE FZZ Centrifugal Portable . . .

Portable Hale Type FZZ Centrifugal Pumping Unit will supply from draft two capable fire fighting streams thru 1½" lines and its performance substantially exceeds the NBFU and NFPA Capacity and pressure requirements for portable pumping units. This unit is a "Forester's Workhorse" for fighting forest, brush, and field fires. **Write for literature on the NEW FZZ and other HALE Pumping Units suitable for Forest Fire Service.**

Ask for a demonstration. No Obligation.

HALE FIRE PUMP CO. CONSHOHOCKEN, PA.

Papers presented by a number of foresters outlined the experience of various countries with eucalyptus planting programs.

Woodbridge Metcalf, extension forester emeritus of the University of California, headed a four-man United States delegation to the conference.

Southern Tree Improvement Conference

Research foresters from all over the nation are expected to attend the fourth biannual Southern Forest Tree Improvement Conference to be held January 8-9 at the University of Georgia in Athens. Headquarters will be located in the Continuing Education Building on the campus.

Purpose of the gathering is to discuss recent accomplishments in forest tree improvements in the South.

Some 41 technical papers written by nationally recognized experts will be presented during the session. Topics will include progress in seed orchard projects, racial variations, control of cone insects, innoculation techniques, flower and seed stimulation, and other timely research problems.

Outstanding speakers in the field of forest geneties will speak on subjects relating to their particular specialties.

Exhibits and publications pointing up various phases of forest research will be displayed and distributed among participants.

Demmon, Gill, Cochran On Formosan Assignment

E. L. Demmon, who retired in October from his position as director of the Southeastern Forest Experiment Station, H. H. Cochran retiring regional forester of the Lake States Region of the U. S. Forest Service, and Tom Gill, forester of the Charles Lathrop Pack Forestry Foundation, left October 31 for a forestry mission to Taiwan (Formosa). The mission is under the auspices of the International Cooperation Administration.

Over the past few years teams of American foresters, assisted by the Nationist Chinese, have been making a careful inventory of Taiwan's forest and land-use situation as a basis for sound plans in the future.

The joint Chinese-American Land Use and Forest Resource Survey has been completed, giving Free China a complete overall picture of its forest resources. On the basis of this survey, Mr. Demmon, Mr. Cochran, and Mr. Gill will recommend to the Free Chinese Government new legislation and the organization of improved land-use and forestry programs.

Mr. Demmon explained that Taiwan's forests have become of great importance on the island, which has a population of about 10 million. So far there has been no systematic plan for sustained yield, with too much cutting in some areas and very little in others.

Canadian Forestry Branch Director Retires

Dr. D. A. Macdonald, director of the Forestry Branch, Department of Northern Affairs and National Resources since 1948, retired October 18, after 42 years of service to forestry in Canada.

Dr. Macdonald is known internationally for his activities in support of forest conservation. In Canada, he was closely associated in the preparation and eventual administration of the Canada Forestry Act of 1949. Through the Act, federal financial aid has been provided for inventories of the provincial forest areas and for reforestation.

Dr. Macdonald served on many Canadian and international forestry organizations. For years he was a director of the Pulp and Paper Re-

BEN C. MEADOWS

I'VE MOVED TO ATLANTA . . . Now Ready To Serve You!

- A **NEW** COMPANY
- A **NEW** ADDRESS
- A **FAMILIAR** NAME

THE BEN MEADOWS CO.

FORESTRY TOOLS and EQUIPMENT

315 PHARR ROAD, N.E., ATLANTA 5, GEORGIA

MY FELLOW FORESTERS:

Yes, I have set up a new company to serve your continuing and growing needs for *forestry tools and equipment.* I've chosen Atlanta because of its many advantages as a distribution center and because it's like a return to the "home town" for me.

In the several years I have been privileged to serve you foresters, by the hundreds, all over North America, I have come to know many of you personally and to know exactly what you need and how you want it.

Forestry is growing. Foresters are increasing in number. Their specialized needs are enlarging. My move to Atlanta fulfils a long cherished personal desire to serve forestry and foresters, as a professional forester myself, through a company under my own name.

My new price list is ready. Please let me know where to send it to you.

CORDIALLY YOURS,

Ben C. Meadows

President and General Manager

THE NEW CENTER FOR FORESTRY TOOLS AND EQUIPMENT

Write — Wire — Phone CH 2601

315 PHARR ROAD, N.E. ATLANTA 5, GEORGIA

search Institute of Canada and the Canadian Forestry Association. He also served as chairman of the Forest Insect Control Board of Canada. He was head of the FAO preparatory conference on World Pulp Problems at Montreal in 1949 and was a member of the advisory committee of FAO's forest research division. He was Canadian Government delegate to the Third World Forestry Congress at Helsinki, Finland, and the Fourth Congress in India. He was chairman of the Sixth British Commonwealth Forestry Conference held in Canada in 1952.

Education

Minnesota Forest Genetics Research Program Receives Grant

Resources for the Future, a nonprofit foundation promoting research in the conservation of natural resources, has announced the granting of $6,000 to the School of Forestry of the University of Minnesota. This fund will be used to enlarge the School's research and training program in forest genetics under the leadership of Dr. Scott S. Pauley. The program was initiated a year ago through the assistance of the Blandin Foundation of Grand Rapids.

The grant enables research assistants to study for a year under Dr. Pauley and to contribute to the program's research in forest tree improvement. Current work is principally concerned with the study of genetic diversity in aspen, jack pine, and white spruce.

The research is carried on at the Cloquet Experimental Forest, the University's Agricultural Experiment Station at Grand Rapids, and at other field locations in the state, as well as at St. Paul.

The students selected to work under the grant are Thomas D. Rudolph, John C. Barber, and Roland E. Schoenike.

Faculty Additions at University of Michigan Announced

Two new professors have joined the faculty of The University of Michigan School of Natural Resources, Dean Stanley G. Fontanna has announced.

Archibald B. Cowan, assistant professor of wildlife management, and Everett L. Ellis, associate professor of wood technology, are the new faculty members.

Professor Cowan has served as Wildlife Research Biologist for the U. S. Fish and Wildlife Service at the Patuxent Research Refuge since 1954. With a B.S. degree and a Ph.D. from the University, Professor Cowan has specialized in the field of wildlife diseases and will teach in this field.

Formerly in charge of wood technology in the College of Forestry at the University of Idaho, Professor Ellis received his B.S. from the University of Washington, his M.S. from Michigan State College, and will receive his Ph.D. from the University of Washington this year. At one time, Professor Ellis worked as a wood technologist with the Chemical Division of the Borden Company.

California Teaching Staff Appointments Announced

Two staff appointments to the University of California School of Forestry have been announced by Dean Henry J. Vaux. Dietrich W. Muelder, a German forester, and Paul J. Zinke will fill vacancies created respectively by the recent retirement of Frederick S. Baker, former dean of the School, and Joseph Kittredge, professor of forestry, emeritus.

Muelder is on the forestry staff of the University of Goettingen at Hannover, Germany. He will serve for a

NOW . . new CUSHION BASE
absorbs road shocks & vibration, reduces wear, increases life of
FORESTER
SEAL TITE
DRIP-TORCH
Proved superior in over 9 years field service
•
Approved for use by U.S. Forest Service
•
NO Flash-back
NO Fuel slopping
NO air-pump
NO pre-heating
NO pressure build-up
NO explosive vapors
Instant operation
SAFE — EFFICIENT
RELIABLE — ECONOMICAL
Burns Diesel Fuel or Stove Oil
Write for folder & price list
WESTERN FIRE EQUIPMENT CO.
69 Main St., San Francisco 5
Closed position
New Base U. S. Patent No 2376976
SEAL-TITE

Little Beaver Tree Girdler
A Compact Unit Simply Designed Especially For Girdling

Girdling Made Fast and Easy

Pine released three years ago by the Little Beaver Tree Girdler.

WHY NOT GET PRODUCTION STARTED NOW with the Little Beaver Tree Girdler in your timber stand improvement operation, in the place of using old slow methods that will require several years to do the job that the Little Beaver Tree Girdler will do in a few months. Don't lose extra re-production, young seedlings released now will mean dollars sooner.
For Details See Your Dealer or Write
HAYNES MANUFACTURING COMPANY
Livingston, Texas

When Writing Advertisers — Please Mention JOURNAL OF FORESTRY

BAKED ENAMEL
METAL FORESTRY SIGNS
for WOODLAND BOUNDARY MARKERS—NO TRESPASSING & FIRE WARNING SIGNS—LOCATION MARKERS—CRUISER TAGS—etc., any size to your specifications. WRITE FOR QUOTATIONS ON ALL YOUR SIGN NEEDS, state size and quantity.
A. L. LIND COMPANY
5036 THOMAS AVENUE SOUTH
MINNEAPOLIS 10, MINNESOTA

TREES FOR FOREST PLANTING
PINE•SPRUCE
We have grown Pine, Spruce and other conifers for 50 years.
KEENE FORESTRY ASSOCIATION
BOX 378, KEENE, NEW HAMPSHIRE

COMPLETE INVENTORY CRUISING SCALE

Hypsometer Biltmore Scale
Rigid When Open
Flexible 6-foot Steel Tape $3.00 EACH
Handy Chrome-plated Case 1¾" Dia.
CARL W. GETZ, President
KURFEW, INC.
Lansdale, Pa.

CUT COSTS 90%
PREVENT ACCIDENTS
• WASH WINDOWS FOUR STORIES HIGH
REMOVE LIGHT GLOBES 60 ft. up
• PRUNE TREES & PICK FRUIT 60 ft. up

Send for Free Catalog
DEPT. J . 300 S. Los Angeles St., L.A. 13, MA 6-9397

year as visiting professor of forestry and forester in the Experiment Station, on leave of absence from Geottingen. He is teaching silviculture.

Zinke, a graduate of the U. C. School of Forestry, with a Ph.D. in soil science, was appointed assistant professor of forestry and assistant forester in the Experiment Station. He teaches dendrology, forest influences, and watershed management and will conduct research on forest soils as they relate to forest growth and on manipulation of forest cover to obtain maximum water yield.

During World War II Zinke served in the 10th Mountain Division, U. S. Army, and saw service in the Italian Alps. Until now he has been a research forester in the California Forest and Range Experiment Station.

Holdsworth Steps Down as Department Head at University of Massachusetts

Robert P. Holdsworth, professor of forestry at University of Massachusetts, has completed his work as head of the Department of Forestry and Wildlife at the university. He will, however, remain on the teaching staff at the school. Arnold D. Rhodes has succeeded Professor Holdsworth as department head.

Professor Holdsworth joined the University of Massachusetts staff in 1930 after teaching for one year at the University of Arkansas. Before turning to the field of education Prof. Holdsworth worked under the Weeks Law and was forest assistant and forest examiner in charge at the White Top Purchase area.

He graduated from Michigan Agricultural College in 1911 with a B.S.F. and in 1928 received his M. S. degree from Yale School of Forestry. He did further graduate study for one year in the Royal College of Forestry in Sweden.

During the summers of 1936 and 1937 he worked with Gifford Pinchot on a new edition of *The Training of a Forester*. In 1953 he was appointed to the Massachusetts Board of Natural Resources and was its first chairman.

Private & Industrial

Company Publishes Newspaper for Woodland Owners

A newspaper is being published by the Bowaters Southern Paper Corporation of Calhoun, Tenn. to pass along

Help Fight TB

Buy Christmas Seals

TIME IS MONEY
SAVE BOTH BY USING
AREAMETER
MEASURE AREAS ON MAPS, PHOTOGRAPHS
FAST, ACCURATE, INEXPENSIVE
WRITE FOR INFORMATION
WESTERN CABINET, LTD.
11002 101 STREET
Edmonton, Alberta, Canada

THE LOWTHER TREE PLANTER PLANTS 10,000 SEEDLINGS PER DAY!
With the Lowther Tree Planter, trees are properly planted for maximum survival in any soil because they have been given the right start.
Three distinct models available to cover all soil conditions and terrain.
•
For details, write:
THE HARRY A. LOWTHER COMPANY
INDUSTRY AVE., JOLIET, ILL.
By The Makers Of The Famous Lowther C-Saw

FORESTERS WANTED!

Inspecting a standing utility pole prior to treatment.

Applications are now being accepted for permanent Foreman positions outlined as follows:

- **NATURE OF WORK** — From April through November most Foremen are occupied with the groundline inspection and preservative treatment of standing telephone and power poles. The Working Foreman is in charge of crews averaging 3-5 men.

  From December through March Foremen operate right of way brush control crews performing selective, basal spraying for utility companies.

- **REMUNERATION** — After a period of on-the-job training that varies with individual capabilities, Foremen can expect to average in excess of one hundred dollars weekly in pole inspection work.

- **LOCATION** — Foremen may be assigned anywhere in the northern section of the Middle West and East.

- **GENERAL QUALIFICATIONS** — Forestry school graduates receive preference. New men can expect to move from place to place every few months. Applicants should be between the ages of 22-35 and state draft status at time of application.

Write or Wire: Utilities Division

OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.

980 Ellicott St. Buffalo 9, N. Y.

useful forestry information to woodland owners.

The first issue of "The Bowaters Tree Farmer," a four-page newspaper, was distributed in October to 15,000 landowners and pulpwood producers. It is "printed on paper made from your pulpwood."

Articles in the first issue pertained to the tree seedling supply, to the tree farm campaign in the Southeast, and described the market offered to woodland owners by the "South's largest newsprint mill." Case histories were used to tell of experiences of successful producers and tree farmers. Numerous photographs illustrated the editorial material and one series of pictures advised landowners what they should do to be ready for a woods fire.

Forestry Association Executives Re-elect Officers

The Council of Forestry Association Executives, in session at Richmond, Va., September 28 and 29, for its 8th annual conference, re-elected M. N. Taylor, executive director of Wisconsin's Trees for Tomorrow, Inc., as chairman. Also re-elected were William E. Cooper, Virginia Forests, Inc., as vice-chairman; and A. M. Williams, Jr., Massachusetts Forest and Park Association, as secretary.

The 9th annual conference will be held at Eagle Rock, Wis., during the first week of October, 1957.

St. Regis Announces Scholarship Awards

St. Regis Paper Company announces the award of five undergraduate scholarships in forestry. The five winners of last year's awards are continuing in their senior years and the second years of their scholarships.

Three undergraduate scholarships are awarded in the South, and one each in the Northwest and Northeast. The scholarships in the South are provided, one each, at Alabama Polytechnic Institute, the University of Florida, and the University of Georgia. Each amounts to $800 a year for a period of two years, and is awarded to an outstanding Junior class student at the schools mentioned.

Scholarship winners in the South were chosen by a committee composed of regional forester Charles Connaughton, U. S. Forest Service; C. Huxley Coulter, Florida state forester; and Albert Ernest, St. Regis vice president in charge of southern woodlands operations.

The winners of the southern scholarships are: Winfred H. Blackmarr, Alabama Polytechnic Institute; David K. Jacobs, University of Florida; and Hugh P. Riley, University of Georgia.

The scholarship winner in the Northwest is Marion W. Fisk, University of Washington. He was chosen by a committee consisting of Regional Forester J. Herbert Stone; Robert Cowlin, director of the U. S. Forest Experimental Station at Portland, Ore.,

Tree Nursery for Sale By Owners

Large, old, well-established wholesale mail order forest tree nursery with excellent reputation doing nation-wide business, specializing in Christmas tree planting stock and ornamental lining out material. Two modern homes (one small), office, a number of other buildings, including modern cold storage. Best new construction. Abundance pure water. Irrigation, equipment, shading material. Inventory of 7 to 8 million seedlings and transplants. Annual sales over $100,000. Can be increased to $200,000. Beautiful location near churches and schools, college town in western Pennsylvania. Exceptional investment opportunity for one or two younger men. Reason for selling poor health. Only financially responsible persons considered.

Send replies to Box D, Journal of Forestry, Mills Building, Washington 6, D. C.

UNASYLVA

FAO's international review of forestry and forest products

(Now in its eleventh year of publication)

Prepared by the Forestry Division and published every quarter in English, French and Spanish, by the Information Division at FAO's Headquarters in Rome. Now in its eleventh year of publication. **UNASYLVA** attempts to cover a range of interest as wide as that of FAO's Forestry Division whose work it mirrors. It is designed to advance public understanding of all aspects of this work.

Regular features are:

Reports **on the activities of FAO and of other international agencies concerned with forestry**

Economic and market reports **on forest product commodities**

Notes on forestry equipment **and**

News items **of current interest on developments in forestry and forest products industries in the 74 member countries of FAO and throughout the world.**

UNASYLVA **may be obtained on payment in local currencies from FAO sales agents. Annual subscription, U.S. $2.50; single copy, U.S. 65 cents. Sales agent in the U.S., Columbia University Press Internatl. Doc. Service, 2960 Broadway, New York 27, N. Y.**

Consulting Foresters

Professional Services Offered by
Members of the Society of American Foresters

schultz — DESIGNERS · ENGINEERS · MANAGERS · SURVEYORS · FORESTERS · APPRAISERS

C. D. SCHULTZ & COMPANY
Incorporated
Vancouver, Canada — Seattle, USA

KEITH CRANSTON, Forestry Consultant
Service to Industry — Personnel Placement
1. Listing of men available for jobs
2. Listing of jobs and employment possibilities
Leland, Mississippi — Headquarters in the Delta Hardwoods
A Southwide Professional Service

INDUSTRIAL FOREST MANAGEMENT

Topographic Mapping — Growth Studies
Watershed Surveys — Timber Cruising
Land Classification — Forest Appraisals

Hammon, Jensen & Wallen
MAPPING AND FORESTRY SERVICES
660 HEGENBERGER ROAD — OAKLAND 21, CALIFORNIA
General Photogrammetric and Forestry Consulting Services

Land Surveyors — *Consulting Forest Engineers*

BELANGER and BOURGET
86 MOUNTAIN HILL, QUEBEC,
P.Q., CANADA

Forest Surveys and Inventories. Establishing of boundary lines.

Forest Management and Logging plans. Locations for Wood industries.

GEORGE BANZHAF & COMPANY
822 North Water Street — MILWAUKEE 2 — BRoadway 6-2062
Consultants to the Wood Using Industries

SOUTHERN TIMBER MANAGEMENT SERVICE, INC.
FORESTRY SERVICES FOR — *TIMBERLANDS AND TIMBER OPERATIONS*
HOME OFFICE: 209½ N. 21st St., Birmingham, Ala.
224 Peach St., McComb, Miss. — P. O. Box 124, Lyons, Ga.
404 Montgomery Ave., Sheffield, Ala. — P. O. Box 964, Auburn, Ala.

and J. M. Lamb, resident manager of the St. Regis mill at Tacoma, Wash.

Andrew P. Nelson of Wolcott, N. Y. is the scholarship winner in the Northeast. He is attending the State University of New York. He was chosen by a committee composed of U. S. Regional Forester Charles Tebbe,; Ralph Marquis of the U. S. Forest Experiment Station, Upper Darby, Pa.; and Paul M. Dunn, St. Regis technical director of forestry.

South Chalks Up Another Record Pulpwood Cut

In 1955, as in every year since 1950, the South again harvested a record cut of pulpwood and maintained its position as the nation's leading pulpwood-producing region. A report recently released by the U. S. Forest Service shows that the 12 southern states last year cut a total of 18,014,600 cords of pulpwood, an increase of 11 percent over production in 1954. This was 58 percent of the total receipts of domestic pulpwood at all pulpmills in the U. S.

The report was prepared by the late James W. Cruikshank and J. F. McCormack of the Southeastern Forest Experiment Station, Asheville, N. C. The Southern Forest Experiment Station, New Orleans, La., and the Southern Pulpwood Conservation Association, Atlanta, Ga., cooperated in gathering the information.

Georgia, the South's leading producer, further increased its lead by adding 702,000 cords to its annual cut. Georgia in 1955 produced 3,760,000 cords of pulpwood. Alabama with a cut of 1,929,000 cords and Mississippi with 1,908,000 cords vied for the second place position. Florida and Louisiana followed with 1,829,000 cords and 1,650,000 cords respectively. All other southern states except Arkansas, Tennessee, and Oklahoma produced more than a million cords apiece.

The report also shows an increase in the use of hardwoods for pulp. In 1955, 2.5 million cords of hardwood timber were cut for pulpwood, 18 percent more than in 1954.

Use of wood residue for pulp in 1955 was also up sharply. Sawmill slabs, veneer cores, and cull cross ties obtained from other wood-using industries total 374,100 cords, almost three times the volume reported the previous year.

A total of 73 pulp mills are now drawing wood from the South. Sixty-nine of these mills are actually located in southern states. Eight additional pulp mills in the South are

SYMBOL of the "EXTRA LINKS"

You Get In Every OREGON® *Chain*

OREGON CHIPPER CHAIN

Built Right BY OREGON

Skillfully manufactured of top-grade steel. Hard-chromed cutters. Will perform with unsurpassed efficiency under the stresses of high speed, friction and heat which are normal to cutting chain use.
Liberally guaranteed.

Backed Right
BY OREGON-*IZED* TFS

Exclusive OREGON-*IZED* TFS assures you the extra-big cutting profits, the extra-long life built into every genuine OREGON Chain.

OREGON-*IZED* TFS
Advantages

1. Free instruction on the fine points of chain saw use.
2. Free chain analysis, filing instruction, maintenance tips.
3. Maintenance service by factory-trained TFS men.
4. Extra-big cutting profits, extra-long chain life . . . the OREGON "extra links."

Qualified-Authorized
OREGON SAW CHAIN CORP.

TFS

TASK FORCE SERVICE
For Chains-Bars-Sprockets

When you have your saw serviced at the shop which displays this sign, you get the two important "Extra links" every chain saw owner wants . . . extra-big cutting profits, extra-long chain life.

This sign is the trade mark of OREGON®-*IZED* TASK FORCE SERVICE for chain, bars and sprockets . . . Oregon Saw Chain Corp.'s international service organization . . . the qualified task-force of thousands of OREGON-trained professional saw chain service men who have the specialized know-how to provide you with the OREGON "extra links" . . . the extra-big cutting profits, the extra-long life built into every genuine OREGON chain.

Near you is an OREGON®-*IZED* TASK FORCE SERVICE SHOP which displays the authorized TFS sign . . . a shop where factory-trained specialists can give you the best possible advice on chain use and filing, the best possible chain maintenance service . . . a shop qualified to back your OREGON chain right.

Take your chain, bar and sprocket problems to your TFS shop with confidence. It's the sure way to get the important "extras" from your chain saw: extra-big cutting profits, extra-long chain life.

© Copyright 1956 by **OREGON SAW CHAIN CORP.**

PORTLAND 22, OREGON

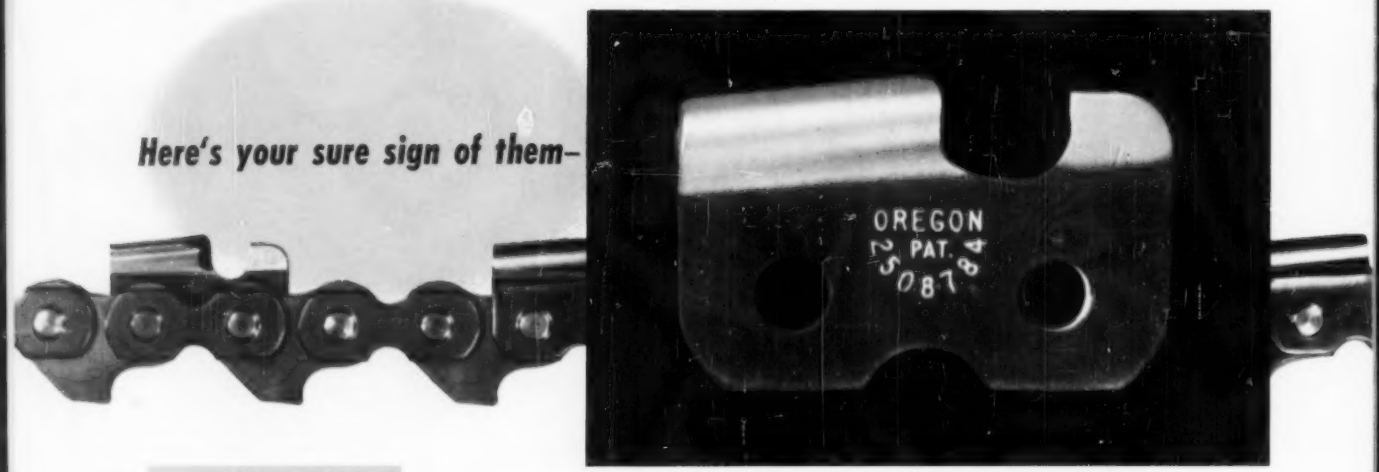
OREGON® CHIPPER CHAIN
The Standard Factory Equipment
and Replacement Chain
Built Right - Backed Right

The Important **OREGON**® *"Extra Links"*

Extra-big **CUTTING PROFITS**

Extra-long **CHAIN LIFE**

Here's your sure sign of them–



OREGON 2 PAT. 2508 — ***Clearly Identified***

The OREGON® trade-mark and patent number stamped into every genuine OREGON cutter are your sure sign that you'll get the important "extra links" which come to every OREGON chain user in the form of extra-big cutting profits and extra-long chain life.

OREGON 2 PAT. 2508 — ***Built Right***

Profitable performance has been designed and built into every chain bearing the name OREGON. This quality chain is skillfully manufactured of special top-grade steel, will perform with lasting efficiency under the stresses of high speed, friction, abrasion and heat which are normal to cutting chain use.

OREGON 2 PAT. 2508 — ***Backed Right***

A qualified nationwide organization of OREGON Task Force Service Shops backs every OREGON Chain as long as it is in use. There is an OREGON Task Force Service Shop near you where qualified, OREGON-trained personnel can show you how to use and file your OREGON Chipper Chain to obtain extra-big cutting profits . . . can help you get extra-long chain life through proper use and maintenance.

OREGON 2 PAT. 2508 — ***Extra Profits Extra Life***

You want extra-big cutting profits, extra-long life from your saw chain. Be sure you get them. Buy genuine OREGON Chipper Chain . . . the chain with the trade-mark OREGON stamped into every cutter . . . the chain that is built right, backed right . . . profit-making, long-lasting OREGON Chipper Chain.

TAKE YOUR SAW CHAIN PROBLEMS TO THE SHOP WHICH DISPLAYS THIS SIGN . .

Qualified-Authorized OREGON SAW CHAIN CORP. TFS TASK FORCE SERVICE For Chains-Bars-Sprockets

© Copyright 1956 by

OREGON SAW CHAIN CORP.

PORTLAND 22, OREGON

either under construction or definite plans for their construction have been announced.

Copies of the 1955 pulpwood production report are available from the Southeastern Forest Experiment Station, Box 2570, Asheville, N. C., or the Southern Forest Experiment Station, 2026 St. Charles Avenue, New Orleans 13, La.

Public

Civil Service Entrance Salaries Raised

The Civil Service Commission on October 2 authorized a substantial boost in the starting pay of foresters and research foresters recruited at grades GS-5 and GS-7. Entrance salaries for GS-5's will be $4,210 instead of $3,670, and $4,930 instead of $4,525 for GS-7's.

A total of 685 new employees are expected to be hired in the next year, mainly by the Departments of Agriculture and Interior, under the new rates which become effective the first pay period after October 20. Of the 685, 500 will be Foresters at the GS-5 level, and 140 at GS-7. Ten research foresters will be hired at grade GS-5 and 35 at GS-7. In addition, 1,250 employees already on the rolls will be affected by the new rates. Of this group, 489 are foresters at GS-5, and 671 at GS-7. Research foresters number 26 at grade GS-5 and 64 at GS-7.

The action was taken by the Commission under the authority granted it by Congress to increase entrance salaries when it is impossible to obtain a sufficient number of qualified workers at the normal entrance rate and when it can be expected that the raise will remedy the situation. However, the increase cannot exceed the maximum salary of the classification grade for the particular type of work involved.

Pyles Named Eastern Regional Forester

Hamilton K. Pyles, for the previous year a staff assistant in the Washington office of the U. S. Forest Service, was named regional forester for the Eastern Region of the Service on November 15 with headquarters at Upper Darby, Pa. He succeeds Charles L. Tebbe, who transferred to Missoula, Mont., as regional forester for the Northern Region.

Mr. Pyles attended the University of

ALBERT G. HALL
Forestry Relations Counsel
Consulting Forester
Member, Association of Consulting Foresters
810 18th St., N.W., Washington 6, D.C.

FRANK J. LEMIEUX
Forester
833 WHITNEY BUILDING
NEW ORLEANS, LA.

WILLIAM J. BOZETT
Consulting Forester
Member, Association of Consulting Foresters
Timber Management & Marketing
LOGAN OHIO

WILLIAM H. PRICE
FOREST MANAGEMENT
Specializing in
Timber Tax Problems
2626 W. Lynn—Seattle 99, Wash.
Al der 7482

WILLIAM A. EASTMAN, JR.
Consulting Forester
Complete Professional Service
SEATTLE 1, WASHINGTON
410 J. GREEN BUILDING
'Phone SEneca 2814

JACK M. HALL
Consulting Forester
Appraisals - Selective Marking
Machine Tree Planting Service
MOULTRIE, GEORGIA

POND & MOYER CO., INC.
Consulting Foresters
Estimates—Appraisals—Surveys
Machine Tree Planting Service
107 HOMESTEAD RD., ITHACA, N. Y.

Reforestation Arboriculture
S. GAYLEY ATKINSON
Consulting Forester
Huntingdon Road
Huntingdon Valley, Pa.

THOMAS G. CLARK,
CONSULTING FORESTER
FOREST LAND MANAGEMENT CO.
P. O. BOX 1046
MORGANTOWN, W. VA.

TIMBER MANAGEMENT SERVICE
J. E. HALL R. W. MEZGER
FORESTRY CONSULTANTS
Technical Assistance to Timberland Owners and Operators in the Ponderosa Pine Region
Klamath Falls, Oregon

NORTHERN TREE COMPANY
Professional Forestry Services
Thomas F. Schweigert, Pres.
Member, Association of Consulting Foresters
Penney Building
Petoskey Michigan

FOREST PROPERTY
Estimates—Appraisals—Management
Prentiss & Carlisle Co., Inc.
107 Court Street Bangor, Maine

LOGGING COST ESTIMATES APPRAISALS
SURVEYS AND MANAGEMENT CRUISING
INTERMOUNTAIN TIMBER SERVICE
Know Your Timber Values and Logging Costs
THOMAS (Tom) C. CLIFTON Tel. 2-4300
Consulting Forester 4101 State St.
Boise, Idaho

Consulting Forester Forest Surveyor
JOHN STOCK
Specializing in Adirondack Forest and Tax Problems
Box 311 Tupper Lake, N. Y.

TREE FARM MANAGEMENT SERVICE
1166-7th Avenue, West, Eugene, Oregon
Protection—Reforestation—Inventory
Utilization—Research
Verne D. Bronson, Chief forester, Phone 5-5371

NORTHEAST FORESTRY SERVICE
STANLEY MESAVAGE, *Consultant*
Forest Management
Timber Production
Forest Products Marketing
HAWLEY PENNSYLVANIA

TIMBERLAND MANAGEMENT, INVENTORY AND APPRAISAL
——OVER 50 MILLION ACRES SINCE 1910
JAMES W. SEWALL COMPANY
FOREST ENGINEERS
OLD TOWN, MAINE
BRANCH: JAMES W. SEWALL CO. (CANADA) LTD., FREDERICTON, NEW BRUNSWICK

HAZARD NURSERY SEEDER

This machine, adapted to large scale nursery planting has been used successfully in Southern State and Forest Service Nurseries for many years. Now manufactured on order. Delivery within a few weeks' time. For additional information address:

James O. Hazard, M.F., 4407 Hunt Place, Nashville 12, Tenn.

GROW TREES

FOR XMAS TREES AND FORESTRY
Fir, Pine and Spruce in Variety
Seedlings and Transplants
Write for Price List
Suncrest Evergreen Nurseries
Box 150, Johnstown, Pa.

NEW REGULATION FIELD CLOTHES

for

U. S. FOREST SERVICE PERSONNEL

Complete Price List on Request

THE FECHHEIMER BROS. CO.
UNIFORMS FOR OVER 75 YEARS
CINCINNATI 2, OHIO

Twenty-Sixth

PANAMA

Anniversary

- **B. B. Fan Drive Pumps**
- **B. B. Slip-on Units** Pump and Engine
- **Slip-on Units Complete** Pump, Engine, Tank, Completing Materials, All on Steel Skids
- **Compensating By-passes**
- **High Pressure Hose**
- **Pistol Grip Cut-offs**
- **Combination nozzles**
- **Vacuum Lift Systems**
- **Automatic Float Valves**
- **Tree Marking Guns** Pressure Type
- **Pyramid Drip Torches** With Preheating Burner
- **Flame Guns**
- **Angle Gauges** For Estimating Basal Area

Write For Free Catalog

PANAMA PUMP CO.
P.O. Box 689
Hattiesburg, Mississippi

California and entered the Forest Service in 1933. He served in various staff positions in fields of engineering, fire control, and watershed management on the national forests in California. He became supervisor of the Cleveland National Forest in southern California in 1946, and in 1952 he was transferred to the Forest Service regional office at Milwaukee, Wis., as an assistant regional forester for the North Central Region. In 1955 he was transferred to the Washington, D. C., headquarters of the Forest Service as staff assistant for the branch of National Forest Resource Management.

E. W. Littlefield Promotion Announced

Conservation Commissioner Sharon J. Mauhs recently announced the appointment of Edward W. Littlefield as assistant director of the Division of Lands and Forests, New York Conservation Department to succeed the late Kinne Williams. The promotion is provisional, pending establishment of a Civil Service eligibility list.

Mr. Littlefield has been superintendent of forest management since 1946. He is a forestry graduate of the University of Michigan and has been with the Conservation Department since 1923, holding successively higher positions in the Department.

William M. Foss is director of the Division of Lands and Forests.

Big Nursery Planned for Georgia

Plans to develop the nation's largest forest tree nursery have been disclosed by Governor Marvin Griffin of Georgia. The Governor stated that construction was to begin immediately. The nursery will cover some 143 acres on Georgia State Prison property near Reidsville and will be operated by prison inmates. It is expected to produce 50 million seedlings a year, with the first seedlings ready for distribution during the fall and winter of 1957-58.

Parker to Head Forest Service Research Division

Appointment of Kenneth W. Parker as chief of the Forest Service's Division of Range Management Research was announced in October by the Department of Agriculture. He will succeed Joseph F. Pechanec, who was recently director of the Southeastern Forest Experiment Station at Asheville, N. C.

CHRISTMAS TREE SEEDLINGS

PLANT A CROP WITH A FUTURE!

Growing Christmas trees beautify idle land, earn satisfaction and profits. We offer a wide variety of seedlings and transplants.

Write today for Price List and Planting Guide.

PAINT CREEK NURSERIES
R. D. 1 SHIPPENVILLE, PA.

METEOROLOGICAL SERVICE

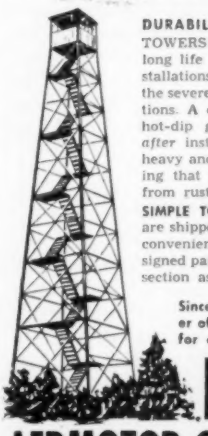
Fire Danger Rating . . . Weather Modification
Forecasts and Advisories . . . Instruments

J. B. "Ben" Melin
2806 32nd Ave., S.
Seattle 44, Wash.

R. Kirkpatrick
1805 N.E. 141st Ave.
Portland 20, Ore.

FOREST SEEDS
of CALIFORNIA
Since 1952
R. S. ADAMS A. P. BAAL
P.O. BOX 561
DAVIS — CALIFORNIA

TOWERS
for Unequalled Strength and Fire Protection!



DURABILITY — AERMOTOR TOWERS have proven their long life in thousands of installations exposed to fire and the severest of weather conditions. A carefully supervised hot-dip galvanizing process, *after* installation produces a heavy and uniform zinc coating that protects every part from rust indefinitely.

SIMPLE TO ERECT — TOWERS are shipped knocked down in convenient bundles: well designed parts make section-by-section assembly easy.

Since 1888, Manufacturer of quality built towers for every requirement.

WRITE TODAY FOR ADDITIONAL FREE INFORMATION

AERMOTOR COMPANY
2500 W. Roosevelt Rd., Chicago 8, Ill.
Dept. 24B12

Since 1952, Mr. Parker has served as range conservationist in the Division of Range Management assigned to field inspection and special studies. Earlier he was in charge of experimental ranges in New Mexico and Arizona, and headed range management research activities of the Forest Service in those states as a member of the staff of the Southwestern Forest and Range Experiment Station at Tuscon, Ariz. He is a graduate of the University of California, with B.S. and M.S. degrees in forestry and first entered the Forest Service in 1937 as a staff member of the Southwestern Forest and Range Experiment Station.

Missouri Conservation Director Resigns

Irwin T. Bode, for nearly 20 years director of the Missouri Conservation Commission, announced his resignation recently, to be effective January 1. Appointed chief executive officer of the state's newly created bipartisan commission in 1937, Bode's tenure of office has spanned the establishment of a scientific wildlife management program that became a national model and the development of a broad program of protection and management for the state's millions of acres of forest land.

Mr. Bode is an Iowa State College forestry graduate. Prior to his assumption of the Missouri directorship he was successively director of the Iowa Conservation Commission, a member of the staff of the U. S. Biological Survey, and in charge of wildlife conservation activities of the U. S. Agricultural Extension Service.

Sidney Weitzman to Head Lake States Watershed Research

Sidney Weitzman has been appointed to the staff of the Lake States Forest Experiment Station as chief of the newly created Division of Watershed Management, according to an announcement by M. B. Dickerman, director of the Station.

Mr. Weitzman is a native of Massachusetts and a graduate of the College of Forestry of Syracuse University. Since 1948 he has been the Research Center Leader of the Mountain State Research Center at Elkins, W. Va., where he was responsible for developing an integrated timber and watershed management program. Earlier assignments in the Forest Service were in Pennsylvania, Mississippi, and Arkansas.

The Station is initiating a program of research to determine the interrelationship between forest cover and streamflow, soil stability, and water yield in the Lake States.

Benton Howard Moves To Northwest Forest Region

Transfer and promotion of Benton Howard, assistant chief of blister rust control for the California Region of the U. S. Forest Service was announced recently by Regional Forester Chas. A. Connaughton. Mr. Howard's new position, effective in October, is chief of insect and disease control in the timber management division of the Northwest Region of the Forest Service with headquarters in Portland, Ore.

Howard will be in charge of directing surveys of forest insect and disease concentrations and the control work necessary to reduce losses in the forests of Oregon and Washington. White pine blister rust control will be a large part of his work. He has spent nearly 25 years in combating blister rust in California.

Forest Supervisor Promoted

Kenneth O. Wilson, supervisor of the Shoshone National Forest, headquartered at Cody, Wyo., has been promoted to a position in the Denver office of the Rocky Mountain Region of the U. S. Forest Service. He has been succeeded at Cody by Irvin P. Murray. Prior to this appointment Mr. Murray was with the staff of the Division of Range and Wildlife Management of the Intermountain Region at Ogden, Utah.

Hawkes Promoted to Regional Forester's Office

Promotion of Carl L. Hawkes to the section of Cooperative Forest Protection in the Division of State and Private Forestry, Pacific Northwest Region, U. S. Forest Service, has been announced by Regional Forester J. Herbert Stone. It was effective October 7. For the last several years Hawkes has been a staff assistant in the forest supervisor's office of the Siuslaw National Forest at the headquarters in Corvallis, Ore.

Mr. Hawkes began work for the Forest Service seasonally during the time he was attending Oregon State College. He graduated with a B. S. in Forestry degree in 1937 and served a year and a half as laboratory instructor in forest mensuration. In 1939 he received an appointment as

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously, the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

Openings for two forestry graduates—one a Farm Forester at Orofino and one a combination Farm Forester-Timber Management Assistant at Boise or the Idaho Falls area.

For more information please contact Deputy State Forester Edward W. Smith, III, State Forestry Department, State Capitol Building, Boise, Idaho.

Forest Engineer position open: Man with minimum two years of forestry education and at least two years of road surveys, drafting, logging engineering, plant operation or construction, or similar engineering background and one year minimum of general forest work. Work in Pacific Northwest or Texas area with expanding engineering and forestry consulting firm.

For details write H. E. Bovay, Jr., Consulting Engineers, 933 West Third Avenue, Spokane, Washington.

Positions Wanted

Forester, B. S. F., Univ. of Massachusetts, 1954. Age 26. Married, two children. Recently discharged veteran. Previous experience limited to summer jobs with the Forest Service. Desire location in Northeast, but will consider others.

Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, B. S. F. 1951, age 28. Desires a change toward greater responsibilities and opportunities. Over 5 years in forest management and silviculture research. An opportunity to learn forest tree nursery management would be welcomed. Married; 2 pre-school children. Top recommendations.

Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, M. F. 1949. Married, 2 small children. Experienced in forest management, forest fire control, forestry educational work, and in pulpwood production. Employed by paper corporation in South. Desire job with progressive concern or individual in South or West in which travel requirements are limited, or somewhat localized, if considerable. Prefer forest management, but will consider other possibilities. References furnished.

Box C, Journal of Forestry, Mills Building, Washington 6, D. C.

INDEX TO ADVERTISERS

	Page
Aermotor	874
Atkinson, S. Gayley	873
Banzhaf & Co., George	872
Bartlett Mfg. Co.	866
Belanger & Bourget	872
Bozett, Wm. J.	873
Bruns, Paul E.	862
Caterpillar Tractor	Third Cover
Clark, Thomas G.	873
Clifton, Thomas C.	873
Cranston, Keith	872
Eastman, Wm. A. Jr.	873
Fechheimer Bros,. Co.	874
Forest Seeds of Calif.	874
Forestry Suppliers	863
Hale Fire Pump	866
Hall, Albert G., & Associates	873
Hall, Jack M.	873
Hammon, Jensen & Wallen	872
Haynes Mfg. Co.	868
Hazard, James O.	874
Homelite Corp.	Back Cover
Keene Forestry Association	869
Kurfew, Inc.	869
Lemieux, Frank J.	873
Lind Co., A. L.	869
Lowther Co., Harry A.	869
Mall Tool Co.	861
Meadows, Ben	867
Melin Meteorological Service	874
Midvale Chemical Co.	865
Motorola	864
Musser Forests	866
Nelson Co.	865
Northeast Forestry Service	873
Northern Tree Co.	873
Oregon Saw Chain	Insert
Osmose Wood Co.	870
Paint Creek Nurseries	874
Panama Pump Co.	874
Pond & Moyer	873
Prentiss & Carlisle	873
Price, Wm. H.	873
Rich Fire Tool	865
Rootspred	862
Ryker, Inc., Harrison C.	862
Schultz & Co., C. D.	872
Sebrell, J. B., Corp.	869
Sewall, J. W. Co.	873
Silva, Inc.	865
Smith Co., D. B.	Second Cover
Southern Coatings	810
Southern Seed Co.	865
Southern Tbr. Mgmt.	872
Stock, John W.	873
Sunerest Evergreen	874
Timber Mgmt. Service	873
Tree Farm Mgmt. Service	873
Western Cabinet Mfg. Co.	869
Western Fire Equipment	868

shelterbelt assistant, Soil Conservation Service, and was assigned to projects in Kansas. He was transferred to the emergency rubber project in California in 1942 as a Forest Service employee.

Hawkes was assigned to the Siuslaw National Forest in 1944. He also received a master's degree in Forestry that year from Oregon State College.

BLM Associate Director Named

Earl J. Thomas has been promoted from the position of assistant to the director of the Bureau of Land Management to the position of associate director. He fills the vacancy created by the resignation of William G. Guernsey last April.

Mead Promotion Announced by BLM

Charles P. Mead has been promoted from land classification and forestry officer, Eastern States Office of BLM, to assistant director in charge of the Division of Technical Progress.

In his new position Mr. Mead will be responsible for direct supervision of cadastral engineering, forestry, international cooperation office, lands, minerals, and range management.

Mead has a B.S. degree in forestry and a master's degree in public administration, both from Cornell University.

Products & Equipment

New Forest Fire-Fighting Aid

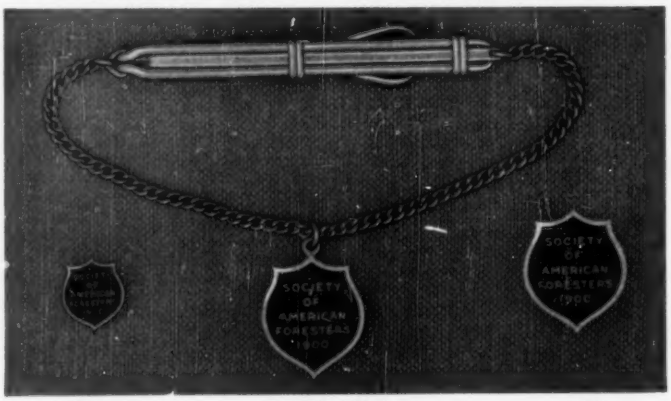
A new weapon in fighting forest fires was recently reported with the United States Borax & Chemical Corp., the U. S. Forest Service, and the California Division of Forestry sharing credit for its development.

In four forest fires, a preparation called "Firebrake" was sprayed from low-flying planes usually engaged in crop-dusting. Results were rated as excellent with the preparation proving itself as a suppressant and retardant in containing the fires.

"Firebreak" is a sodium-calcium borate preparation mixed in water at a ratio of four to six pounds per gallon, producing stable suspension. It may be used with ground equipment or by aerial drop. It is expected to prove particularly useful as a retardant and holding agent until crews can get into the blaze.

For "HIM" at Christmas

Distinctive SAF Membership Emblem



Button	Tie Chain	Pin
$2.50 ☐	$6.00 ☐	$4.00 ☐

THE EMBLEMS pictured above in actual size are 10K gold, with gold letters on a dark green background surrounded by a gold border. All grades of members are eligible to wear these emblems. Order the style you prefer from:

SOCIETY OF AMERICAN FORESTERS
425 Mills Bldg., 17th St. and Pennsylvania Ave., N. W.
WASHINGTON 6, D. C.

Cutting a fire lane for the Crosby Lumber & Mfg. Co., this D2—smallest tractor in the Caterpillar line—delivers dependable, heavy-duty performance on the company's 150,000-acre tract.

TOUGH "LITTLE" D2

—powerful enough to do a good job skidding, cutting fire lanes or fighting fires; small enough to be easily trucked!

With Crosby's modern fire-spotting methods, it usually takes only about five minutes from the alert to get the D2 rolling toward the fire area.

The Crosby Lumber & Mfg. Co., Crosby, Mississippi, practices modern fire prevention methods on its 150,000 acres of timber. Average loss is held to about 250 acres a year. The company, under supervision of J. R. Clark, Supt. forestry and logging, uses a light plane to patrol the area. Its equipment line-up includes the following Caterpillar-built machines: this D2 with No. 2S Bulldozer and fire plow; one D2 with fire plow only; a D4, a D6 and a D7 with bulldozers; one No. 212 Motor Grader and one D318 Engine. Forester Pat Molloy says: "Our company has used Caterpillar-built equipment for years. We find that for all-around service, durability and toughness, it can't be beat."

During the season, this D2 averages 8 hours a day, 5 days a week, cutting fire lanes. With 38 drawbar horsepower and a maximum drawbar pull of 3120 lb., it has the capacity to *outwork* any machine in its power range. What's more, with its four-cycle CAT* Engine, it has the ability to do it with *less* maintenance and at *lower* cost. Here's why: There are no air boxes or cylinder ports to clean as in two-cycle engines. The fuel system requires no adjustment. And you can use low-cost No. 2 furnace oil without fouling for a substantial saving both in fuel and maintenance costs.

Like all rugged yellow units, the D2 is backed by prompt service from your Caterpillar Dealer. He has the trained mechanics, genuine parts and specialized facilities to do *any* job fast and right. See him for complete information about the D2. Name the date—he'll be glad to demonstrate!

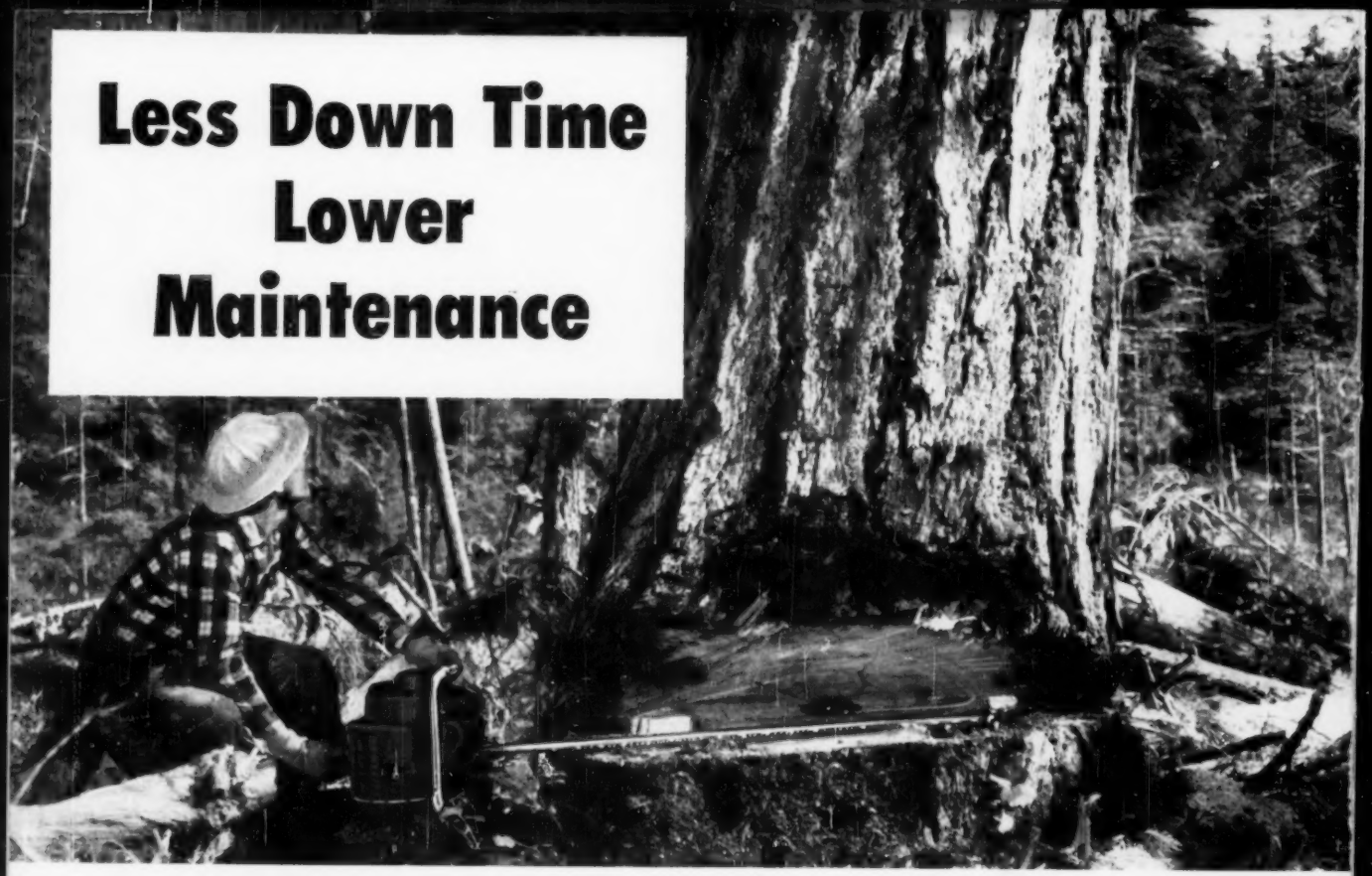
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

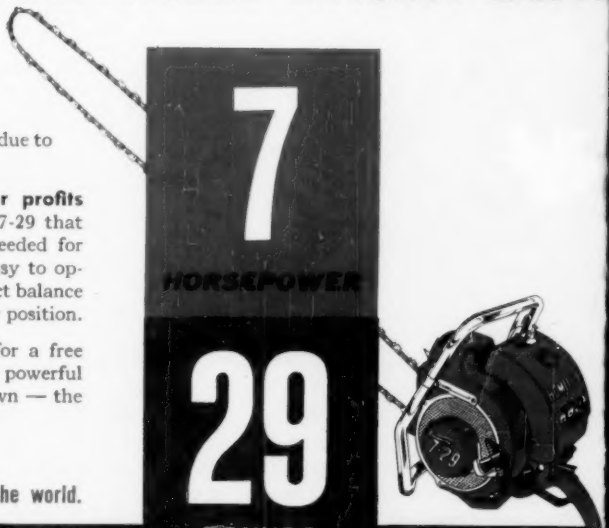
*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co., U. S. A.

USE CAT EQUIPMENT FOR HEAVY-DUTY PERFORMANCE

Less Down Time Lower Maintenance



The most powerful one-man chain saw you can own



You get more of the features you want in the Homelite 7-29:

Less down time because the famous Homelite precision design features high-compression, short-stroke engine which prolongs life, cuts gas consumption, starts quickly in any weather.

Lower maintenance with a belt drive that eliminates stretch, never requires adjustment or lubrication; built-in governor keeps engine at proper speeds, stops excessive wear and greatly prolongs life of the saw by reducing vibration, eliminating damage due to engine racing.

More production, greater profits with this powerful Homelite 7-29 that does every kind of cutting needed for high-production operation. Easy to operate, easy to handle, the perfect balance makes every type of cut in any position.

See your Homelite dealer for a free demonstration of the most powerful one-man chain saw you can own — the Homelite 7-29.

Homelite builds and sells more chain saws than any other company in the world.

COMPLETE LINE OF CHAIN SAWS FOR EVERY CUTTING JOB

Model 17 — an all-purpose saw that brings down trees up to 4 feet in diameter. Available with special brush cutting and clearing attachments for complete versatility. 3½ horsepower, 20 pounds.

Model 5-20 — All the versatility of the 17 with added power. 5 full horsepower — 20 pounds. Brings down trees up to 6 feet in diameter.

Model EZ — lightest, most powerful direct drive chain saw ever developed. Only 19 pounds, full 5 horsepower. Brings down trees up to 3 feet in diameter.

HOMELITE

A DIVISION OF TEXTRON INC

4112 RIVERDALE AVE., PORT CHESTER, N. Y.

Manufacturers of

carryable pumps • generators • chain saws • blowers